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Contents

PAGE

Editorial Notes: Labour Saving Machinery; The New Act; Institute Policy; A New Use for Sewers; Railway Rates Revision; A Wise Concession 29
The Calendar... 31
Does Mechanical Handling pay? By A Mechanical Engineer... 32
The Storage and Handling of Potash. By G. F. ZIMMER, A.M.Inst.C.E. 34
Application of Electrical Power to Modern Handling Plants. By H. C. WIDLAKE, A.M.I.E.E. 38
The Discharge of Material in Bulk from Railway Wagons. By HERBERT BLYTH, M.Inst.C.E. 41
Society of Chemical Industry: London Section... 44
The Dyestuffs Act: Applications for Licences 45
The Outlook for 1921. By E. J. P. BENN 45
From Week to Week 46
References to Current Literature 47
Patent Literature 48
Monthly Market Report and Current Prices 51
Company News: Chemical Trade Inquiries 55
Commercial Intelligence: New Companies Registered... ... 56

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Labour Saving Machinery

OUR issue this week contains a series of special articles dealing with the mechanical handling of materials with particular reference to the use of machinery in connection with many of the operations carried out on chemical works. The subject of labour-saving is one upon which no generalisation is possible, for local circumstances, prevailing facilities, and, above all, the magnitude of the works must in all cases be the deciding factors influencing a decision one way or another. Some of the contractors who make a speciality of this type of machinery have on occasion remarked that the chemical works engineer shows as yet little enthusiasm for the subject, and they suggest that this apparent indifference is due to the fact that those in authority on such works have not yet learnt to appreciate the services of the engineer as they should. The chemist, perhaps, may in some cases require educating as to the advantages of machinery, and it has been our endeavour to place before him, from a neutral standpoint, information which will at least keep him in touch with the developments occurring in the industry, and which will probably set him thinking about problems which otherwise he might never have contemplated. That the chemist is by no means distrustful of mechanically-operated plant when its merits have been fully established is illustrated by the remarkable extension in the use of such appliances, for example, as mechanical roasting furnaces. Association with some of the latter in their early days may have given rise to a certain amount of scepticism, but experience has triumphed over the original defects, and to-day we are reaping the benefit of the enterprise of those who wrestled with a novelty and succeeded, by a process of evolution, in bringing it to something approaching practical perfection.

It is, perhaps, unnecessary to emphasise the importance of viewing the question of applying machinery to some particular purpose from every possible standpoint. Some minor detail overlooked when the scheme is designed may mean all the difference between success and failure, and those of our readers who may be contemplating plant of the kind are strongly advised to study the points brought out by a mechanical engineer in an article on the subject of "Does Mechanical Handling Pay?" The question of power is one which must nearly always be dependent upon local facilities, but for convenience electricity presents many advantages providing attention is given to those small but telling points which are emphasised in the article of Mr. C. J. Widlake. In justice to Mr. Herbert Blyth it must be said that he is one of the very few mechanical experts who have taken an interest in the possibilities offered by chemical works, and both in the lecture room and in the technical press his name has been prominent during the past twelve months. The article he contributes in this week's issue deals comprehensively with a number of different methods of performing the same duty, and should prove a valuable reference, both now and in the future.

The New Act

THE Board of Trade announcement, published on another page of this issue, reminds all concerned in the dyestuffs industry that the Dyestuffs (Import Regulation) Act, 1920, comes into force on Saturday, January 15, and that import licenses will be required in respect of any goods covered by the Act which may arrive in the United Kingdom on or after that date. Applications for such licenses should be addressed to the Secretary, the Dyestuffs Advisory Licensing Committee, Danlee Buildings, 53, Spring Gardens, Manchester, and should contain the particulars specified in the notice. The meetings of the Committee, it is understood, will be held regularly in Manchester, as the largest centre of the industry, though arrangements may possibly be made later for the receipt of appli-

cations in London and other centres. Special forms of application will presently be available, but in the meantime applications by letter giving the requisite information will be considered. The same urgency which characterised the passage of the Bill through Parliament is thus observed in the application of its provisions to the industry.

It is a little surprising that no announcement is made at the same time of the constitution of the Advisory Committee. It is understood in quarters supposed to be well informed that the three manufacturers' representatives have been agreed on, though the names, when disclosed, may not be quite those expected. Of the five consumers' representatives agreement is reported to have been reached concerning the majority. Here the point of greatest interest is whether the Board of Trade has yielded to the very natural and reasonable pressure in favour of the inclusion of a trader representative. At the moment, nothing is known publicly beyond the fact that the matter is receiving serious consideration. If for no other reason than to avoid any cause of friction and discontent with the administrative machinery of the Act, it would certainly seem desirable to make this small concession, which would conciliate the important merchanting community without appreciably affecting the representation of either dyestuff makers or users. The selection of three independent members (from whom the chairman will be nominated) is perhaps the most difficult matter, for these members must be free from technical or commercial interests and yet possess unquestionable technical and commercial qualifications, as well as absolute independence of judgment. The announcement of the eleven names cannot, of course, be much longer delayed, and when they appear it is to be hoped they will command the confidence of the public.

During the progress of the Bill through Parliament a demand was made for a complete schedule of the chemicals and dyestuffs prohibited under the Act. Some such list is essential for the information of the trade, for the terms are so broad as to leave it doubtful whether some are within or without the provisions. In this connection, however, too much dependence must not be placed on the present limitations, for already a strong demand is being made for the extension to fine chemicals of the protection already granted to dyestuffs. The larger key industry Bill, which is expected to be one of the earliest and most important measures of next session, will almost certainly include fine chemicals within its scope. We are thus face to face with the prospect of complete protection over a period of ten years of the organic chemical industry in this country, and the prohibition also, except under license, of the importation of foreign chemical, scientific and illuminating glassware. These restrictions are intended, of course, to limit the competition of foreign countries, to enable our young industries to establish themselves; but they may also, unless some scheme of preferential treatment is devised, hit some of the chemical enterprises in our own Colonies, particularly Canada. This legislation is all based on the principal of national safety. On this ground it is supported, or at least acquiesed in, by numbers of people who distrust all forms of protection as tending to weaken initiative and to eliminate the motive to progress. This loyalty to a national pledge places on all engaged in the protected industries an imperative obligation to the nation. If they fail us, they will not soon be forgiven.

Institute Policy

THE Institute of Chemistry, in the current volume of its *Proceedings*, deals at length, as one might expect, with the recent Peterson judgment which prohibited the Pharmaceutical Society from taking part in the promotion and establishment of an industrial council for the drug trade or industry. The objects of the Institute, it is pointed out, are quite different from those of the Pharmaceutical Society, though the judgment is of interest because of its general bearing on the activities of chartered bodies. The view of the Council, that the Institute consisting of employers and employees cannot adopt the functions of a trade union, appears to have ample support in the arguments and judgment of the case, apart from the question of the desirability or otherwise of promoting such an organisation. That the Institute, however, can take definite action for the protection of the professional interests of its members is shown by its action respecting the practice of colleges, particularly agricultural colleges, undertaking professional work. Several of these institutions, subsidised by the State and by municipal grants, require their teachers of agricultural chemistry to conduct analyses for agriculturists in their respective districts at nominal fees. This system the Institute condemns as frankly as any trade union might on the ground that it not only affords a privilege to one section of the community at the expense of the public, but imposes on the teachers duties which are liable to interfere with their educational work, and involves in many cases undue interference with independent practice.

A New Use for Sewers

EVEN the sewers have not escaped the attention of the modern scientific economist. It is said that the Ministry of Health is investigating the claims made by an Australian inventor as to the yields of gas from this source. The idea is to generate a septic gas from ordinary towns' sewage, and it is estimated that three cubic feet of gas per day might be obtained per head of population. Analysis of the gas has shown that on an average it consists mainly of methane (60 per cent.), the remainder being accounted for by nitrogen (17 per cent.) hydrogen (8 per cent.), carbon monoxide (14 per cent.), and oxygen (1 per cent.). It has been suggested that the Government, instead of damming the Severn, should segregate the sewage; but, in face of the insistent demand for economy this is unlikely. There is, however, no reason why advantage should not be taken of the bacteriological action in septic tanks, which, properly designed and controlled, yield continuously a gas of very high calorific power. As regards the use of this gas for power, tests have been made to determine the horse power developed by engines, and the results showed conclusively that no difficulties are experienced, no back-firing occurs, and the running is perfectly steady.

The average consumption of the gas available in

an efficiently designed engine is approximately 14 cubic feet per brake horse power per hour, and from data published regarding the volume of gas available from septic tanks installed in various parts of the world, it would appear that the yield lies between 2½ cubic feet and 4 cubic feet per 24 hours per head of population. Assuming a value of 3 cubic feet per 24 hours per head of population, which figure would certainly be exceeded in any tropical or semi-tropical country, the septic tank system of Paramatta (where the principal experiments have been conducted) which serves 13,000 persons, would yield 39,000 cubic feet of gas per 24 hours; and this, on the basis of 14 cubic feet per brake horse power per hour, would be capable of developing approximately 115 brake horse power continuously, or practically 9 brake horse power per 1,000 inhabitants. There can be no doubt that in the majority of cases this gas can be used with great advantage in pumping operations associated with the sewage system and the horse power available should in any community be sufficient, if the power were not required for pumping, to generate electrical energy to light the streets, and supply light and power also to private consumers, provided, of course, a suitable storage battery were installed to take care of the peak load. It is stated that the gas is odourless, smokeless, and dry, and can be stored in holders in the usual way.

Railway Rates Revision

CHEMICAL manufacturers and traders who have presented evidence before the Rates Advisory Committee as to their grievances respecting the carriage of dangerous goods will be interested in at least one concession recommended in the committee's report. The majority of traders asked that local tribunals should be set up as conciliation boards without any coercive powers, and the committee agree that it is desirable to give such bodies a trial. The proposal is that in each of the great distributing centres two panels should be formed, one consisting of representative traders, and the other of officials of the railway companies serving the district, and that from these panels a committee should be constituted to which any trader having a grievance might make application. The object of these local tribunals is mainly to secure a hearing for traders who have a strong belief that if a genuine grievance is properly represented to the railway authorities redress is usually obtainable, but that too often minor officials summarily dispose of complaints without full consideration of the merits. One hears exactly the same kind of complaint in relation to shipping companies, and one step towards removing the sense of grievance is provision for an impartial hearing. It is announced by the Ministry of Transport that the Rates Advisory Committee will now undertake a further inquiry into the classification of goods—a subject of immediate interest to chemical traders. Objections or alternative proposals to the railway companies' scheme may be lodged up to January 31. A preliminary meeting to discuss the general principles and procedure to be adopted in regard to the new classification will be held on January 18 in the Old Hall, Lincoln's Inn.

A Wise Concession

THE Council of the Society of Chemical Industry may be congratulated on a minor concession they have just made to the members' desire for a little more information. For the first time, so far as we have observed, there appears in the current issue of the *Journal* a brief report of the Council's December meeting. The proceedings are not exactly epoch-making. We learn that the draft programme of the Annual General Meeting to be held in Montreal next year, and the draft rules of the new Section at Shawinigan Falls, Canada, were submitted and approved; that the proposal that the Society should nominate representatives to confer with delegates of the Chemical Society with a view to effecting more co-operation in the matter of chemical publications was adopted; that the Council supported the demand for legislation to restrict the importation of foreign chemical, scientific, and illuminating glassware in order that the industry may be retained in this country; and that 39 new members were elected. These are not matters of vital importance, but the members appreciate the information, if only as an acknowledgment of their right to know what their representatives are doing, and as an indication of a less conservative attitude of mind. This movement, though small, is promising. Once began it is sure to grow. Its effect will be to increase the confidence and therefore the interest of the members in the work of the Council. It is welcome evidence to all the friends and well-wishers of the Society that a liberalising and progressive leaven is quietly at work.

The Calendar

Jan.		
8	Institution of British Foundrymen: Annual Dinner.	Manchester.
10	Royal Society of Edinburgh: "The Transverse Galvano-magnetic and Thermomagnetic Effects in Several Metals" by F. Unwin. 4.30 p.m.	Edinburgh.
11	Institute of Metals: "Segregation in Non-ferrous Alloys," by E. A. Smith. 7.30 p.m.	Imperial Hotel, Temple Street, Birmingham.
11	Sheffield Association of Metallurgists and Metallurical Chemists: Annual General Meeting. 7.30 p.m.	Assembly Room, Royal Victoria Hotel, Sheffield.
12	Society of Chemical Industry (Newcastle-on-Tyne Section): "Colloids," by Emil Hatschek 7.30 p.m.	Newcastle-on-Tyne.
13	Institute of Chemistry	North-Western Hotel, Liverpool.
17	Chemical Industry Club Monthly Meeting. Address by Mr. H. E. Coley, on his recent tour in Borneo. 8 p.m.	2, Whitehall Court, London.
18	Hull Chemical and Engineering Society: "Evaporators and Evaporation," by J. A. Reavell 7.30 p.m.	The Metropole, West Street, Hull.
20	Chemical Society. 8 p.m. ...	Burlington House, Piccadilly, London
20	Royal Institution of Great Britain: Lecture by Arthur Harden, D.Sc., F.R.S.	21, Albemarle Street, London.
20	Society of Colourists and Dyers (West Riding Section): "The Dyeing of Artificial Silk."	Yorkshire.

Does Mechanical Handling Pay?

By a Mechanical Engineer

Mechanical plant to-day is so costly in comparison with its pre-war value that those who contemplate its installation want to be assured that it will effect economy. The following article discusses the standpoints from which the whole subject should be viewed, and draws attention to one or two points of particular importance which are frequently overlooked. The article is followed by a series of others dealing with the subject of labour-saving appliances in a more specialised manner.

It is all very well to talk glibly of the introduction of labour-saving machinery in chemical works, but the question of prime importance is as to whether economy is going to follow. No two cases are the same, and in every instance where mechanical-handling plant is contemplated local circumstances may entirely affect the case one way or another. Machinery to-day costs some 250 per cent. more than it did in 1914, repairs and spares have risen in proportion; while, with financial conditions as they are at the moment, it is not always convenient for a private undertaking to raise the wherewithal to meet a heavy capital expenditure.

When discussing the question of labour-saving machinery considerable thought is necessary, so that the various charges and counter-charges are correctly balanced the one against the other. The principal considerations which each engineer must apply to the case in question may be briefly enumerated as follows:—

(*a*) Can the operating costs be curtailed, and, if so, what will be the annual saving?

(*b*) Will better working results or greater output follow the introduction of machinery? If a greater output is obtained from the plant already in use, what will be the effect in terms of wear and tear?

(*c*) Is the saving effected by (*a*) and (*b*) likely to be sufficient for meeting the standing charges for interest on capital, depreciation, and repairs?

(*d*) Will efficiency be sacrificed in order to effect an apparent economy? Loss of efficiency may mean indifferent results in other directions.

(*e*) Will the reduction of labour relieve the management of any anxieties not actually measurable in terms of money?

The last-named consideration is of very considerable importance, in that the peace of mind of those in authority counts for a great deal in the present times of high pressure. The question has two aspects, namely, the less the extent to which manual labour has to be relied on, the less is the dislocation which follows upon strikes, while the management is placed in a vastly more comfortable position for arguing when met with threats. On the other hand, machinery is not necessarily any more reliable than labour, and it is particularly harassing to find that the operation of a whole works may be seriously disturbed by the sudden breakdown of some more or less trivial detail of the mechanical plant.

The Question of Power

A question of importance to-day is the provision for and type of power to be employed for operating machinery. Electricity is now generally regarded as the ideal, but towns' gas provides an alluring alternative, while for many types of plant hydraulic or compressed-air power is most suitable. The drawback to electricity when taken from the public supply is that it is still something in the nature of a luxury, and careful attention (particularly in connection with the larger schemes) should be given to the alternative of generating the current at the works by means of towns' gas, producer gas plant, or steam power. It may be noted that many of the modern gasworks employ electrical power for operating the host of different appliances, from telphers to heavy stoking machinery, which are now a feature of their equipment. In nearly all such cases, however, the current is home-generated, usually of the direct type derived from direct-coupled gas engines and dynamos. This policy is found far more economical than that of taking the alternating supply from the public mains, but it must be borne in mind that a gasworks enjoys the privilege of getting its gas for power at "cost-into-holder" price, which is substantially less than the official public rate. On many chemical plants there is a source of fuel suitable for steam-raising which probably has little value for any other purpose, and in such cases it is worth while considering the generation of electricity by means of steam. Moreover, coke breeze is a comparatively cheap fuel, and furnaces for its combustion may now be said to be perfected.

Considerations of Capital

Perhaps the most important point which has to be settled to-day is:—What is the capital value of a workman? In other words, what capital outlay on machinery is permissible in order to save the wages of a single workman? In the majority of cases those displaced will be of the ordinary labouring variety paid at the lowest rates, for mechanical labour-saving machinery seldom does the work of the skilled craftsman paid at the special rates ruling for his trade. It is as well to bear in mind, in fact, that, while unskilled labour is partly eliminated, the attention demanded by machinery involves the introduction of skilled labour to operate and repair it. The wage of the ordinary labourer to-day averages about 1s. 7d. per hour; and, apart from the consideration of overtime, he works 47 hours a week. In addition to this there are further outgoings in the way of National Health Insurance, holiday pay, and, in some few cases, profit-sharing or other forms of bonus. Such extras may, in fact, be allowed for by assuming that in a year a man receives roughly fifty-four weeks' pay. Accordingly, the expenditure per labourer per annum amounts to approximately £200, and £200 represents (at 6 per cent.) the interest on a capital of £3,330. Coming to the case of machinery, the charges on the capital cost of the installation which have to be met annually have been shown to be adequately allowed for by setting aside, (*a*) 6 per cent. for interest, (*b*) 5 per cent. for wear and tear, and (*c*) 7½ per cent. for depreciation or the writing off of capital; that is, a total of 18½ per cent. per annum. It should not be overlooked, however, that during the fourteen years over which repayment of capital is spread the yearly interest to be met is gradually undergoing reduction, and averages, not 6 per cent., but 3 per cent. So that, taken over the whole period of the working life of the apparatus, the total charges to be met are $(3+5+7\frac{1}{2})=15\frac{1}{2}$ per cent. Now, £200, the equivalent of a labourer's total earnings, represents the interest (at 15½ per cent.) on an outlay of £1,300. Therefore, it may be assumed as a general statement that the capital outlay permissible on mechanical plant may be reckoned with safety at £1,300 per man displaced by the plant. The figure is certainly striking, and indicates that in cases where a reduction of ten men or more can be foreseen comparatively large schemes may be undertaken. It is the smaller schemes, in fact, which demand the most thorough scrutiny: for, owing to the present day cost of apparatus, such schemes may run into a comparatively large sum.

Protection Against Failure

In no case to-day should payment for plant be made immediately upon completion. It will be generally agreed, although it is an unpleasant fact to have to face, that workmanship to-day is not of the quality which characterised it in pre-war days. The purchaser must, therefore, protect himself from dislocation or expenditure which might arise from imperfect work or material soon after the plant is started up. As a matter of fact, the general run of contractors is just as anxious to provide a satisfactory job as the purchaser is to have one, but even the contractor cannot always foresee defects which may arise, particularly as in the most cases he may himself be dependent upon the thoroughness of several sub-contractors. It will be wise, therefore, for the respective purchaser, to indemnify himself against trouble by arranging beforehand to pay only 80 per cent. of the total cost on completion, the remaining 20 per cent. being met, say, six months after completion when the apparatus has given satisfaction. All contractors of repute are perfectly alive to the wisdom of some such arrangement, and are usually quite ready to fall in with it. The purchaser, again, should ensure that, when the scheme is a large one and delivery is effected in stages, he only makes

payment on account against delivery. Occasionally, an arrangement is made that payment be made on completion of the various parts at the maker's works. The case is not a common one, but it is worth while recalling instances where, owing to some entirely unforeseen cause, the contractors have become insolvent. In this case the official receiver takes matters into his own hands and commandeers everything on the contractor's works even though it may have been paid for, but not delivered to his clients. The situation created is a complicated one, and usually causes untold annoyance and delay to the purchaser.

Machinery-Structure Ratio

As wear and tear and depreciation are usually so important an item in connection with labour-saving plant, it will pay those who contemplate machinery to make a careful study of the ratio of moving parts to fixed structure in various alternative methods of handling. It does not require much imagination to see that the most economical plant is that which entails 90 per cent. of fixed structure and 10 per cent. of moving parts, rather than the one which introduces 90 per cent. of continually operating plant. Wear and tear, also depreciation, are far more severe on moving rather than on stationary structures, and one might draw a parallel between the modern telpher (involving only one moving carriage) and the conveyor with a considerable length of continuously travelling chain.

Does machinery pay? The answer to the question is that in nine out of ten possible cases it does; but everything depends upon the forethought which is given to the selection of the plant, the angle from which the project is approached, and the care which is bestowed upon the scheme in its early stages when as a novelty it requires particular attention and coaxing until the newness of its principle has worn off.

Apron Conveyors

For carrying loose material from one part of the works to another, especially where elevation is necessary in the course of transit apron conveyors are great labour savers. In fertilizer plants and cement mills loading is greatly facilitated by this device. In works where barrels, casks or carboys are continuously being taken in off trucks, barges or rail this means of conveyance to the department destination where they are required from the point of delivery is a neat and rapid method.

Jeffrey Apron Conveyors at Work.

Aprons for this purpose can also be adopted to carry loads from one floor to another without fear of rough handling or constant agitation, as when barrels or casks are rolled.

Chemical and fertilizer plants have found the Jeffrey standard Apron Conveyor, a practical means of keeping their goods on the move. In the illustration will be seen bags which have been filled by the sacking machines in the background, they have then fallen upon the apron below, which is carrying them along at a slow rate to enable men to sew the bags while actually in transit. Works having their own railway sidings can have the apron laid down to the very trucks, so that loading can be effected direct from the point of output without any lifting.

Hugh Wood & Co., Ltd., 65, Fenchurch Street, E.C., are the sole agents in this country for the Jeffrey apparatus.

Aerial Ropeways

Aerial ropeways as a means of transport made small progress in this country until recent years. The idea, which originated somewhere in the East over 1,500 years ago, as shown by history, became what it is to-day by evolution.

Transport problems, especially in chemical works, are not generally solved by large mechanical installations, except in special cases. Simplicity is the essential qualification in most of the present day establishments.

Modern times and the enormous strides that the great war has caused to be made in the vast engineering and mining industries, have brought the matter of cost as an essential, far in advance of simplicity itself, and those engineering and mining concerns, in their efforts not only to cut costs but actually to double their productions are gradually transforming the horse and cart and various other old-time means of transport into almost prehistoric objects.

This transformation opens the way for the aerial ropeway system, which will transport hundreds of tons per hour over enormous distances, sometimes as great as 30 or 40 miles, and where one might have seen masses of horses and carts and the like controlled by hundreds of men, one now sees this never tiring and endless mechanical operation, practically self-controlled, handling in one hour what would heretofore have taken days of wearisome labour. In its objects the aerial ropeway has unlimited application. Systems transporting ores, coal, loose material, &c., can be seen in all parts of the world and those concerned whilst realising an immense economical factor, look to their increased productions confidently.

The aerial ropeway system has spread to far distant corners of the globe, where in some instances it stands alone as a means of transport. Sweeping across wide valleys and ascending mountains rising precipitously 2,000 ft. or more, the aerial ropeway has opened up the resources of countries that might otherwise remain for ever shut out from the sphere of enterprise.

The number of installations of various aerial ropeways systems in the United Kingdom alone is increasing rapidly, and already such firms as The British Ropeway Engineering Co., Ltd., have made known this wonderfully efficient means of transport by practical demonstrations to our busy colonies which appreciate its multifarious uses for mining and other purposes so extensively.

Pneumatic Co veyors

For elevating and conveying chemicals, small coal, ashes and other material, the pneumatic system has many advantages. It is a labour saver. The whole of the machinery can be placed in the engine room or any other convenient spot. There is freedom from dust. The pipes can be carried against the walls or overhead, or even outside the buildings, which are, therefore, quite unaffected as regards space and convenience. Not a grain or particle of material can be wasted or crushed. The plant, which for example we refer to, is made by H. J. H. King & Co., Ltd., of Nailsworth, Gloucestershire, consists of an air pump, discharger, dust collectors, fixed piping, junction valves, flexible tubing and nozzle. The air pump is a vertical reciprocating pump driven by electric motor, or from steam or other engine, or preferably by direct steam power, and can be placed anywhere within reasonable distance of the work. The power required is about 2 h.p. per ton per hour.

Eight or ten shops and the wholesale warehouses of J. Savage & Co., Ltd., at Bradford, are being acquired by Casson Chemical Co., Ltd., of Westbourne Grove, London. The movement is said to be in opposition to an American attempt to capture the retail drug business in this country.

The Storage and Handling of Potash

By G. F. Zimmer, A.M.Inst.C.E.

Potash is a particularly difficult material to deal with, owing to its tendency to cake into a solid mass when left for any length of time in the store. Withdrawal from storage frequently entailed in the past the use of explosives. Mr. Zimmer describes below the most modern methods of dealing with the problem.

ENORMOUS deposits of potash salts are found in France and Germany, which are mined and accumulated in large quantities in storehouses specially constructed for their reception throughout the year, whence they are withdrawn, principally in the spring and autumn for agricultural purposes.

Potash when mined and when subsequently handled in the factory is fairly dry and easily manipulated, and, when in coarse grain or pulverised, may be accumulated into high heaps, but if allowed to remain undisturbed in such heaps for a long time it absorbs much moisture from the air and cakes together into a solid mass. Great difficulty is, therefore, experienced in withdrawing potash when required, and the mining operations by which it was first obtained have practically to be gone through a second time with pick and shovel; even blasting has been necessary in order to reclaim this rock-like accumulation. If reclaimed from such heaps in this way the material breaks up into large and small pieces of varying hardness, mixed with much fine powder, and in this form potash is not readily nor economically conveyed, whereas reclamation by mechanical means can be performed at much less expense, besides yielding the material in uniform and marketable condition. Another consideration when stocking potash is the fact that it is mined at approximately uniform rate throughout the year, while it is withdrawn from stock only during two short periods—*i.e.*, in spring and autumn. The mechanical device, therefore, which brings the potash to the store, must be equal to the output of the mine, while the capacity of the reclaiming device must be equal to the peak demand during these two short seasons of withdrawal. Owing to the dusty nature of these materials, the roofs and all objects surrounding the storehouses are covered permanently with white dust; this coating absorbs moisture from the atmosphere to such an extent that a corrosive liquid drips from all projections and is very destructive to iron roof principals, girders, &c. For this reason it has been found expedient to construct these storehouses for potash and super-phosphates and other similar chemicals, of timber; and, in order that the floor space of such stores should be unencumbered, all supporting columns are avoided as much as possible. The space thus obtained is more important than at first appears, especially when portable reclaiming devices are in use, as it affords the operator a clear field in front of him, so that he need consider nothing but his uniform cut along the different faces of the heap. If columns are unavoidable, they are placed a long way apart and built of ferro-concrete, while iron girder supports for the roof are enclosed in concrete, or otherwise protected from ocntact with the chemicals or the resulting dust.

Types of Machinery

The mechanical handling of such chemicals in their storehouses has developed into a fine art. The fundamental principle of the devices used is a hybrid form between a dredger and a scraper, conveyor or elevator. In the earlier installations a jib crane travelled longitudinally through the centre of such stores, the vertical crane post being mounted on wheels upon a single central rail track, while the upper end was guided between two rails secured to the roof principals. In more modern installations the crane is fitted with a luffing and slewing derrick, which supports a scraper or dredger 40 ft. long; the conveyor can thus work at any angle, and even horizontally when the heap at either side of the crane path has been reduced down to the floor level. Longitudinally under the central crane rail is a culvert in which a conveyor works, leading to one end of the store. The scraper or dredger is alternately fitted with sharp rakes and blades, and works downwards, raking the potash into the central conveyor. Such stores are filled either by a band conveyor in the roof, which, by means of a throw-off carriage or push-plate conveyor without bottom plate, forms a prismatic heap, which fills the store from end to end. A cross-section through such a store is given in Fig. 1. This store is nearly 200 ft. long, 100 ft. wide and 18 ft. high; it holds 20,000 tons. The handling device can fill the store at the rate of 25 tons per hour, and withdraw at the rate of 50 tons per hour. When down, the derrick reaches practically to the side walls.

A potash store of a simple kind has been described by Professor Stefan,* and is illustrated in Figs. 2, 3, 4 and 5. This store is 20½ metres wide, and may be of any length. The potash is brought into the store by an electrical mono-rail telpher line, which automatically drops its load through bottom doors at any predetermined spot by the tipping skips coming in contact with a tripper; one of the skips is shown in the cross-section. In the event of the potash having to be loaded direct into railway trucks the traffic of the telpher is conducted on to a loop line, each skip as it passes over the receiving hopper *via* a shoot discharges its load, and the trucks are filled.

Drawing from Store

When the potash has to be reclaimed the heap, which will have caked together into a solid mass, can be systematically removed by a portable device with a vertical cutting edge, composed of a continuously running chain of buckets fitted with sharp cutting edges which produce a uniform, marketable product. Such a portable device will be understood from Fig. 2. It is mounted upon two large road wheels and a large

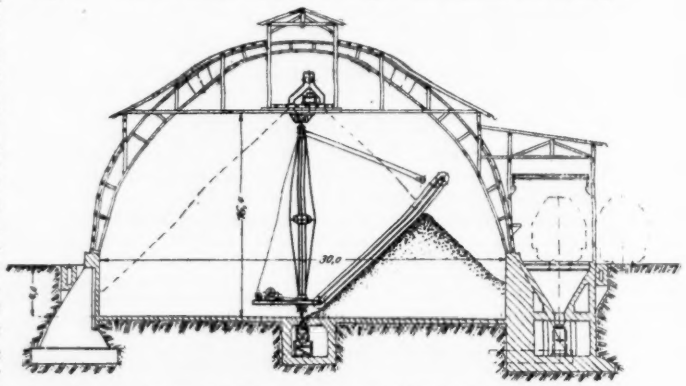


FIG. 1.—CROSS SECTION THROUGH MECHANICALLY-EQUIPPED POTASH STORE, OF AN EARLY TYPE. (THE DIMENSIONS GIVEN ARE METRES).

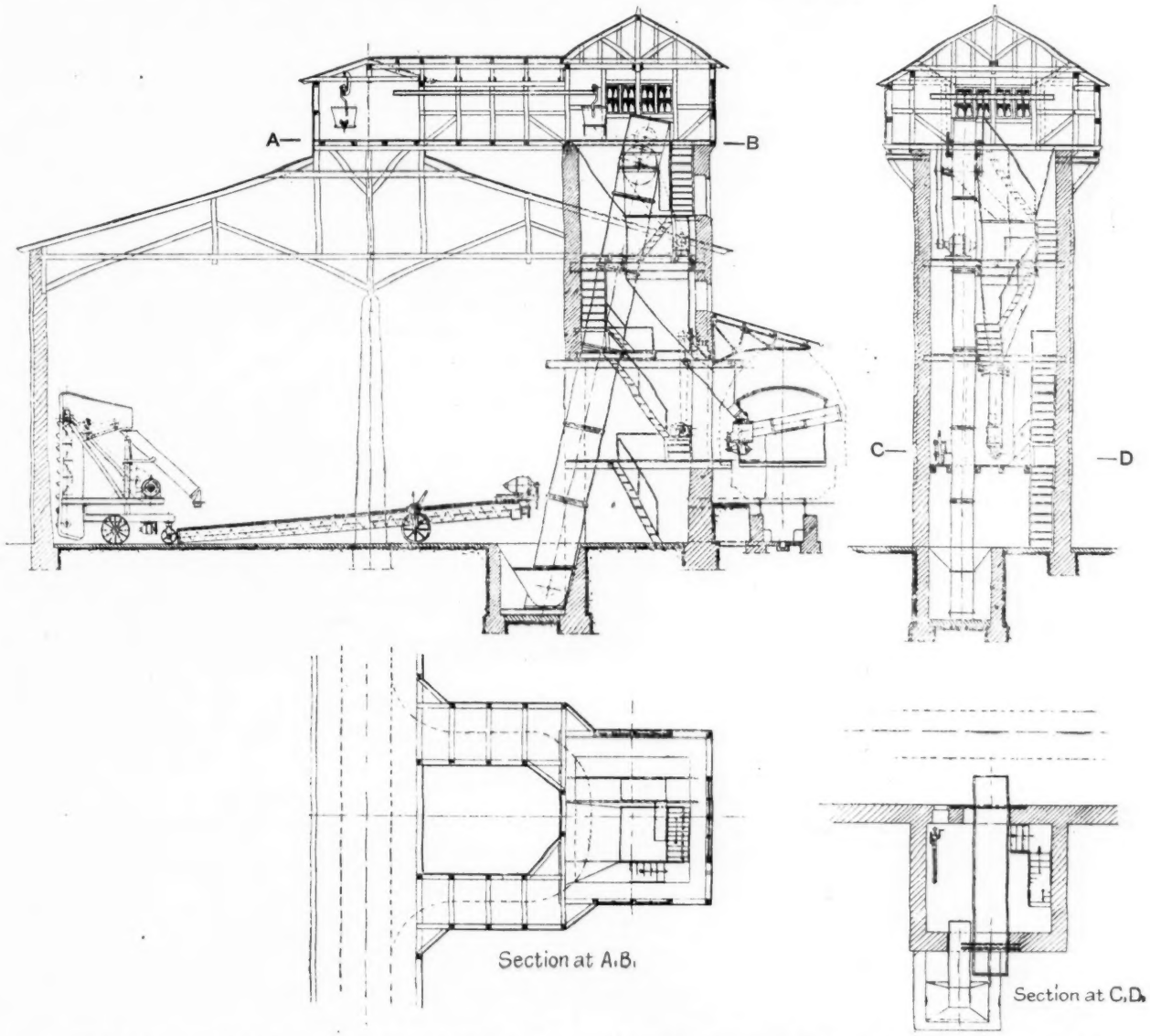
caster. The cutting and lifting device is similar to a bucket elevator, and is suspended from a jib which slews like a crane round a central column in the body of the vehicle. The potash is raked or scraped off by the upward motion of the chain of buckets, and is delivered on the upper terminal on to a short band conveyor, which again delivers into a swivelling shoot, which, in turn, deposits the load on to one or more units of portable worm conveyors delivering into the well of a stationary bucket elevator. The portable worm conveyors are 10 to 12 metres in length, and are each driven by an electric motor. As an alternative the potash can be filled into sacks from the shoot of the reclaiming machine, in which case there is a double outlet and a butterfly valve, so that two sacks can be attached at the same time. The bucket elevator delivers into a bin in the loading tower, the exit of this bin is opened or closed from the loading platform, and delivery is first made into a small preliminary bin, which runs on wheels on overhead girders, then into a worm conveyor, which will twist on a pivot in either direction, and can reach any corner of the box trucks in which the potash is generally transported in bulk. From the cross-section of Fig. 2 can be seen the hopper with the loading worm from which the truck can be completely filled. The loading worm has, in addition to the end delivery, one or more intermediate outlets controlled by slides, so that every portion of the truck can

* *Foerdertechnik*, July 15-22, 1919.

be reached. In order to control the amount loaded the railway truck stands on a weighbridge, and the supply is interrupted the moment the correct weight is reached.

Portable handling devices are connected by flexible leads to specially constructed wall plugs, which can be closed when out of use, and thus protected fron the corrosive influence of the material.

A similar but larger installation, also for portable reclaiming devices, is represented by Figs. 6 and 7. The timber roof is self-supporting, and the store is charged by a longitudinal band conveyor in the roof, which is, in turn, fed by another upon the skill of the attendants for their capacities, and proved altogether inadequate for the growing importance of the potash industry, and with the increasing size of the stores more adequate provision for loading and unloading became necessary. The outcome was a plant for a large double store—a cross section of which is represented in Fig. 9. Some trimming was necessary with the use of the smaller plant, but the one under consideration only requires the services of one man, who can handle over 100 tons per hour. The forward motion of this machine, which is now mounted on an overhead traveller, is practically automatic.

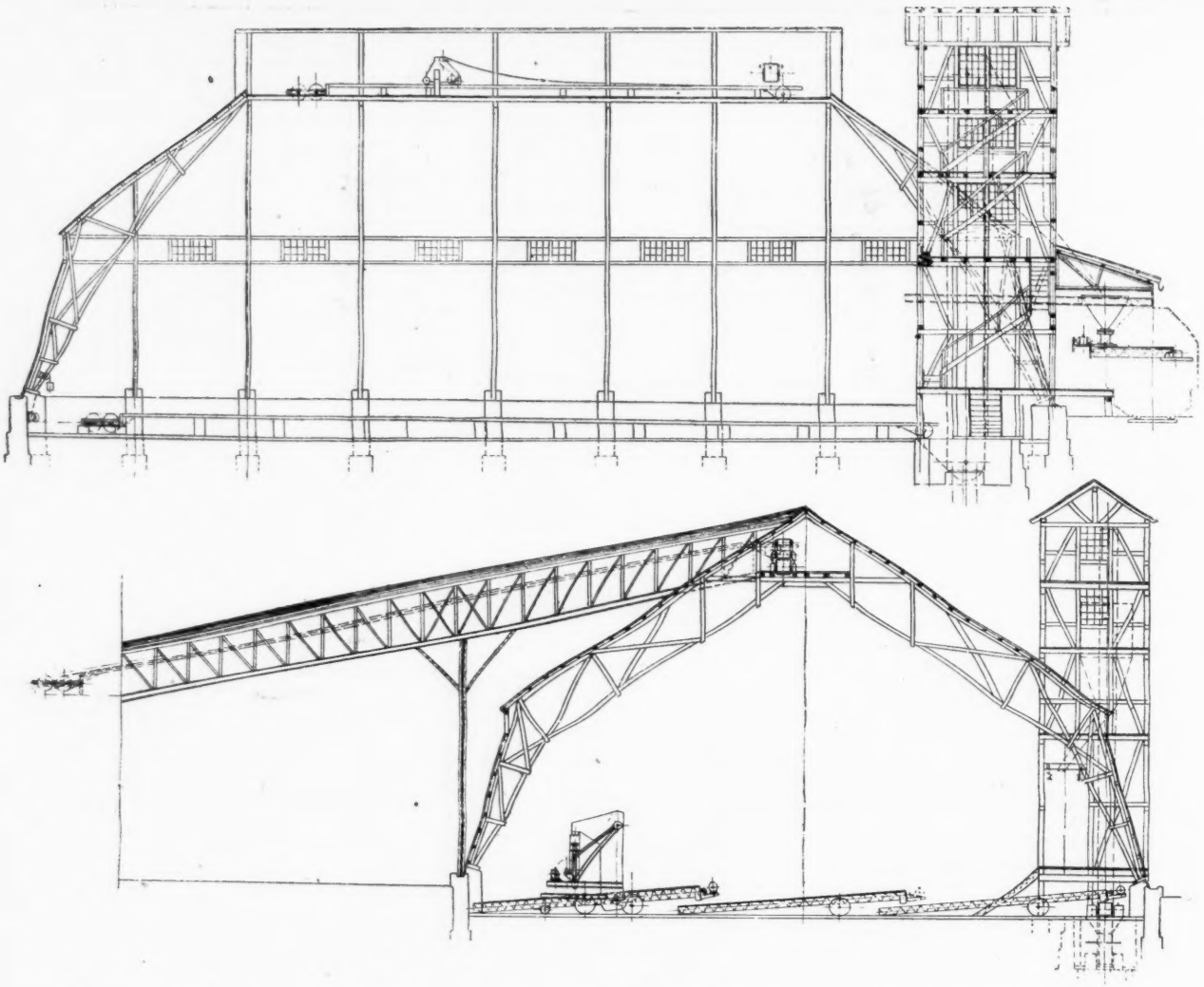


FIGS. 2, 3, 4 AND 5.—TWO ELEVATIONS AND TWO PART PLANS OF A MECHANICALLY-EQUIPPED POTASH STORE, WHICH IS FED BY AN ELECTRIC MONO-RAIL TELPHER, AND THE POTASH RECLAIMED BY PORTABLE MACHINERY.

one at right angles to it; a throw-off carriage deposits the potash at any part of the store forming a big, shaped heap. The material is reclaimed in the same way as in the former installation, by similar portable devices. Three portable worms are used, feeding each other, and every one has its own motor.

A similar installation to that shown in Fig. 1, but in which the dredger is independent of the roof support, is shown in Fig. 8. This self-contained machine is mounted on a double rail track.

These earlier installations depended to a great extent The whole operation is safer, for now no breaking down of large masses can, as formerly, injure man or machine, since everything is now hinged from the top instead of from the base, so that no one need be on the floor of the store. We thus see a complete reversal of the proceedings in the later devices; instead of the potash being dragged down it is now dragged up, and the conveyor is more like a dredger than a scraper conveyor. The latest dredger can be raised into a horizontal position, and the whole apparatus can travel clear of the contents of the store, and can begin digging operations at any point, which was formerly not possible.



FIGS. 6 AND 7.—CROSS AND LONGITUDINAL SECTIONS THROUGH A POTASH STORE FED BY TWO BAND CONVEYORS, AND THE POTASH RECLAIMED BY PORTABLE MACHINES.

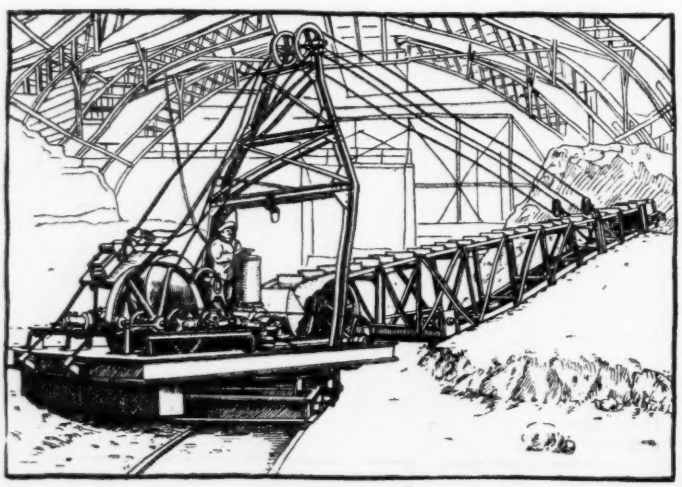


FIG. 8.—VIEW OF A SELF-CONTAINED RECLAIMING MACHINE MOUNTED ON RAILS, AND RUNNING THROUGH THE CENTRE OF THE STORE.

Reversible Machines

When the store is to be filled the two band conveyors in the roof are used, and the worm conveyor, working to right and left, will level the heap. When the potash is withdrawn the dredger takes the material up and delivers it into a band conveyor; the machine is also reversible so that the dredger can work down hill and loosen the material, and then work up hill and collect and deliver it into the said band conveyor. The small scraper shown in the rear of Fig. 11 is an afterthought, and was installed to permit a surcharge of 20 per cent. over the former holding capacity of the store. Both dredger and scraper conveyor can deliver simultaneously on to the same band conveyor.

The *modus operandi* is as follows: The potash is ground in the mill adjacent to the store and delivers into the store by two band conveyors with automatic throw-off carriages, and before the potash has had time to harden in the heap it is flattened out by the worm as with a "strickler" by slowly running the mechanism over the top. During the few months in which the potash is sold it is loaded direct from the mill into railway trucks, and the accumulation in the store is only drawn upon when the daily delivery from the mines is below the requirements. The band conveyor delivering from the store feeds into a machine which breaks up the lumps, then into a hopper, from which it gravitates into the railway truck. Box trucks are used and filled without manual labour

by a worm conveyor on a pivot which reaches right into the van. The hopper just mentioned must be completely empty at the end of each day, or the contents will harden during the night and cease to run out by gravity. Similar devices were installed for other chemical salts, ammonium sulphate, &c.

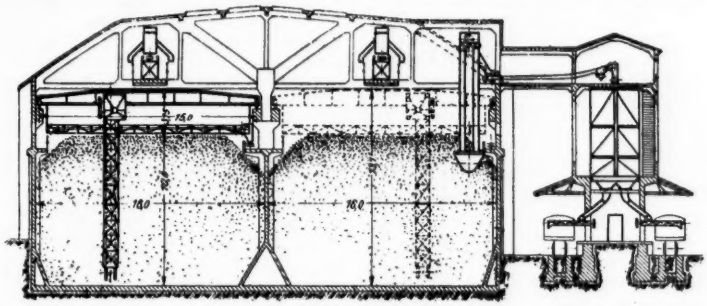
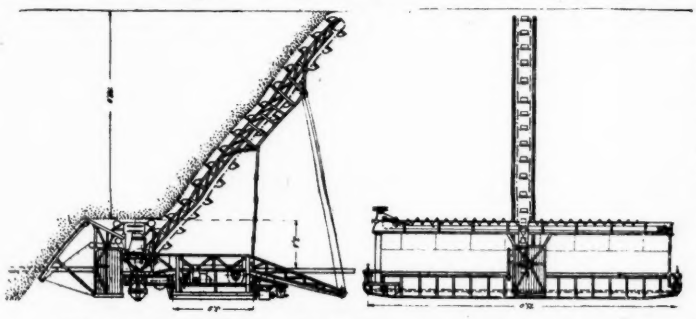


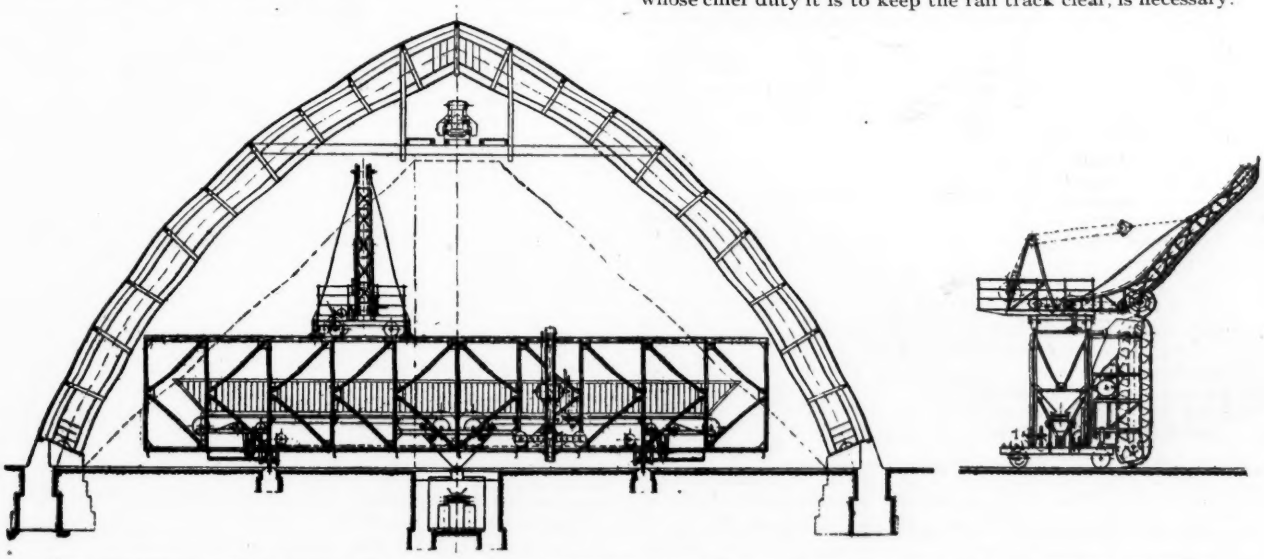
FIG. 9.—CROSS-SECTION THROUGH A LARGE POTASH STORE, FED BY TWO BAND CONVEYORS, AND RECLAIMED BY OVERHEAD MACHINERY. (DIMENSIONS IN METRES).

Distant Control

A somewhat different system, also described by Professor Stefan, is shown in Figs. 12 and 13. The roof here is also of timber and self-supporting. The mechanical devices for conveying are exclusively band conveyors, one in the roof brings in, while another in the culvert below the floor takes away, while the reclaiming machine travels on two rails along the whole length of the store. This machine is shown in front and side elevation in Figs. 12 and 13; it extends the whole width of the store. In this reclaiming machine are two band conveyors, each about half the width of the store, delivering towards the centre and on to the band conveyor in the culvert. On the working face of this machine is portably mounted a scraper elevator on the same principle as the one already described. This device takes a vertical cut from the heap of potash and elevates into a hoppered trough of the same length as the machine, which in turn delivers on to either of the two first-named band conveyors forming part of the machine. The scraper elevator is partly suspended from the jib of a travelling crane which traverses automatically backwards and forwards on the main body of the reclaiming machine, while the lower end of the elevator receives an additional support by a wheel on a third rail track. In addition to the scraper elevator there is a second similar device mounted on the jib extension, which reclaims the upper portion of the heap and delivers likewise into a hopper and eventually into one of the band conveyors. Where the upper and lower elevators join there is a revolving cutter which detaches the potash that would otherwise be left between. The whole installation is electrically driven and all actions are controlled from one point. The flexible cable leads are held taut by rollers and weights, in order that they should not lay about and encumber the progress of the machine. This arrangement will permit the paying out of cable as the machine progresses. The reversal of the cutting machine at the end of each journey, as well as the advance of the whole machine after each cut, are quite automatic. Only one labourer, whose chief duty it is to keep the rail track clear, is necessary.



FIGS. 10 AND 11.—LARGE SCALE FRONT AND SIDE ELEVATION OF THE RECLAIMING MACHINE SHOWN IN FIG. 9.



FIGS. 12 AND 13.—CROSS-SECTION THROUGH A MECHANICALLY-EQUIPPED POTASH STORE FED BY A BAND CONVEYOR, IN WHICH THE RECLAIMING MACHINE DELIVERS INTO A BAND CONVEYOR, WITH A LARGER VIEW OF THE MACHINE PROPER.

Application of Electrical Power to Modern Handling Plants

By H. C. Widlake, A.M.I.E.E.

IN laying this contribution before the readers of THE CHEMICAL AGE, the author desires to point out that, in an article of limited length, it is impossible to do more than handle the subject in a very general manner, and to express the hope that at some future date he may be permitted to deal comprehensively with the many interesting problems attending the application of electricity to up-to-date handling machinery.

In an age when the uses to which electrical power is put are practically universal, it is difficult to select any particular type of plant on which such applications have been attended

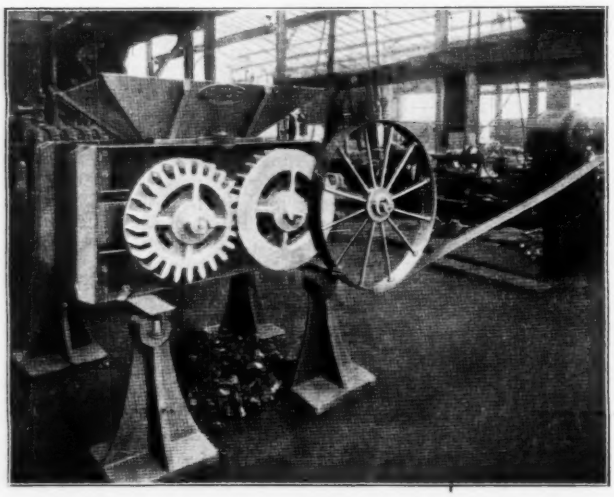


FIG. 1.—BELT-DRIVEN COAL CRUSHER.

with an exceptional degree of success, but it may be safely asserted that few plants have derived a greater all-round benefit from electrical operation than have those installations put up for the bulk handling of materials. In these days of strenuous competition and high labour charges, an expenditure of two or three thousand pounds with the object of saving the wages of one permanent employee is fully justified, and recognition of this fact on the part of responsible engineers is to be seen in the ever-increasing number of elaborate handling plants, without which no factory can claim to be up to date.

The fact remains, however, that, highly efficient though the general lay-out of a handling plant may be, the best economic results can only be realised if the prime moving agents possess the following characteristics :—

(*a*) Low first cost.

(*b*) Low attendance charges.

(*c*) Occupies small floor space as compared with other types of power motors of equal power.

(*d*) Low operating costs per brake horse-power-hour or per ton of materials handled.

(*e*) *Absolute reliability.*

The electric motor undoubtedly possesses the first three essentials in the fullest possible degree, and on these grounds is preferable to any other type of prime mover ; but, so far as running costs are concerned, no hard and fast statement can be made, as these charges must vary in different districts according to the rate at which electrical energy can be purchased from an extraneous source, or, alternatively, generated on the works in a private power house equipped with either gas or steam-driven generating units.

Reliability

Coming to the question of reliability, it may be accepted as a *sine qua non* that on a well-installed and properly maintained plant the electric drive will be found to be absolutely reliable, always provided that the source of electricity supply is immune from interruption. In this connection it may be remarked that NO extraneous supply of power, whether it be in the form of gas or electricity, is cheap AT ANY PRICE if it is subject to interruption. On a works making serious use of electrical power as the sole driving agent for the various units of its plant it is very difficult to estimate the loss attendant upon a cessation of supply, and this consideration provides a strong argument for the employment of private generating plants run under the control of the works management.

In all parts of the country such plants are to be seen running year in and year out with a degree of economy and reliability which might well be the envy of many a central station engineer.

Nature of Supply

In the case of a works taking its supply of electrical energy from an extraneous source, the question of nature of supply is automatically solved, and it is only when the new plant complete with its own generating units is under consideration that the necessity arises for dealing with this point.

For the driving of machinery, the modern choice lies between a three-phase alternating-current supply and a continuous-current supply, each of which possesses its own particular characteristics, advantages and disadvantages. The main argument for the use of an alternating-current supply arises when electrical energy has to be distributed over a wide area, when, by the use of step-up transformers or high-pressure generation, a considerable saving can be effected in the design of the transmission lines. So far as the motor end of the installation is concerned, the use of continuous current is to be preferred, particularly in the case of crane, haulage and telpher installations, and many engineers whose works are supplied with an alternating current go to the trouble of putting down converting machinery in order to enjoy the advantages of continuous current for the operation of the above-mentioned machines. For drives in which the motor can be started light, or against a small load, and the main load

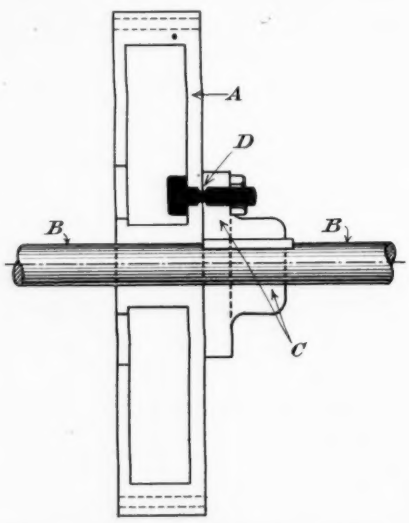


FIG. 2.—SAFETY TRANSMISSION COUPLING.

thrown on gently through the medium of fast and loose drives, friction clutches, &c., the alternating-current motor is very suitable, and in its simplest form possesses the virtue of mechanical simplicity in a high degree. On the other hand, when such motors have to be capable of starting under heavy loads, their general design becomes such as to no longer give them any advantage over the direct-current motor on the grounds of mechanical simplicity. In addition to its capacity for starting up against a heavy load, the direct-current motor

possesses the further advantage of a wide range of economic speed regulation in the finest possible steps.

It is highly probable that the commercial development of the Williams-Janney system of power transmission and speed control will prove an inestimable boon to users of alternating current plant and may even bring about a revolution in our existing methods of power application.

Method of Driving

The development during recent years of high speed gear and chain transmissions has brought a large amount of abuse on belt drives generally, but the fact remains that there still exists a large field for this latter well-proved if somewhat ancient method. In many cases expensive positive drives have been the cause of mechanical smash-ups which might have been averted or at least greatly minimised had the motor been belt-coupled to its work.

Failures of belt drives are more frequently due to faulty design and barbarous handling than to any characteristic disadvantage of that method. In the plant under the author's control the nature of the drive applied to any particular machine depends upon whether it is subjected to mechanical hang-ups.

To illustrate this point the reader is referred to Fig. 1, which shows a Bennis coal crusher coupled to an electric motor by a good long open belt drive. Such a unit of plant is peculiarly subjected to hang-ups owing to foreign substances finding their way between the crusher rolls, with the result that a tremendous shock is thrown on the rolls and transmitted to every mechanism positively connected thereto. In this instance the belt acts as a safety device and by leaving its pulleys saves the costly motor from that damage which a positively coupled machine might easily suffer. The same argument applied to push plate conveyors, elevators, slag grinding mills and similar plant in which there is the ever-present possibility of a hang-up. It has been argued that in such cases the functioning of the electrical protective devices should save the situation, but it must be remembered that the energy stored up in a moving mass of machinery must be dissipated before the machine comes to a rest and it is by the destructive dissipation of this energy that damage is done.

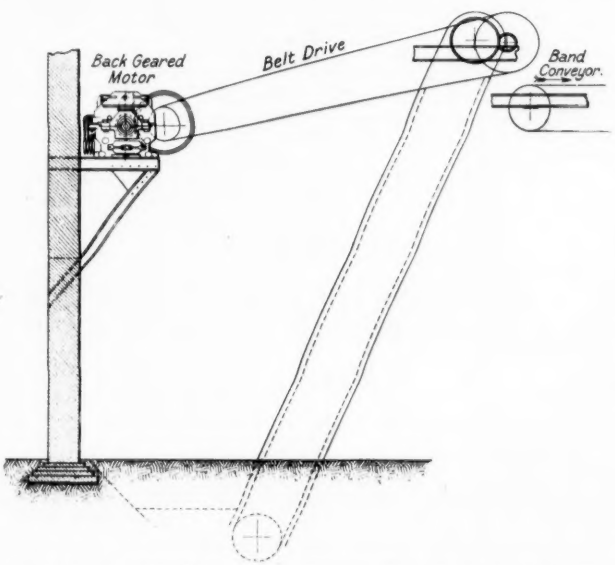


FIG. 3.—BACK-GEARED MOTOR DRIVING ELEVATOR AND CONVEYOR.

Belt drives admittedly cannot altogether prevent such occurrences, but they can and do localise the damage and save the more costly high-speed portion of the drive.

Where space does not permit of the use of belt drives modern practice provides a safety device in the form of an intentionally-weakened coupling which is illustrated in Fig. 2. This shows a spur wheel (*A*) mounted but not keyed upon the shaft (*B*). The boss of this spur wheel forms a half coupling and by means of bolts is secured to a half coupling (*C*) securely keyed upon the shaft. The coupling bolts, however, are deliberately weakened by having their diameter reduced at the point where the shearing strain comes, namely where the two portions of the coupling meet each other. The depth of the groove (*D*) turned in the bolts at this point is such that under normal conditions they will transmit the normal driving effort, but in the event of a hang-up they shear through at the weakened portion, and the spur wheel, relieved of its overload, is free to revolve upon the shaft. Some designers, instead of using a steel coupling bolt weakened in the manner

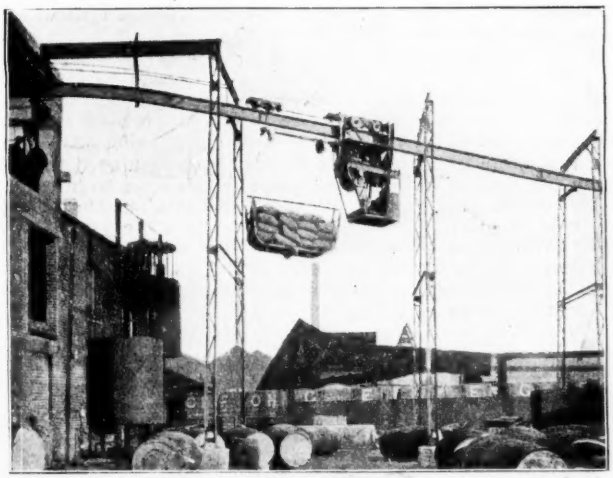


FIG. 4.—STANDARD MONO RAIL TELPHER.

described, employ bolts of an inferior metal, such as copper, in order to introduce an element of weakness at the required point.

A very favourite method of combining the advantages of belt and gear drives lies in the use of a back-geared motor belt coupled to its load and this method is illustrated in Fig. 3. The driving end of a bucket elevator and band conveyor is shown in section. Into the wall over the boot of the elevator a small platform is built for the accommodation of a back-geared motor. The back shaft carries a driving pulley from which a long belt drive rises to the driven pulley at the elevator head. The arrangement shown can easily give a speed reduction ratio of thirty to one.

Telpherage

The growing popularity of the mono rail telpher, particularly for high-speed transportation over a devious route, warrants a description of its equipment, and in Fig. 4 is illustrated a standard mono rail telpher by Messrs. Strachan & Henshaw, of Bristol. It is equipped with two motors, one for travelling and one for hoisting, and while these, from the duty point of view, need not necessarily be of the same size, the author strongly advocates the use of electrically and mechanically-duplicated motors on the grounds of standardisation and the minimum outlay in respect to spares. The motors are of the totally-enclosed series wound crane-rated type and are operated from a single controller via a change-over switch. This method ensures that the two motions cannot be carried out simultaneously and as the telpher is essentially a high-speed machine, this precaution is necessary in the interests of safety. As will be seen from the illustration the machine is equipped with a pair of collecting arms, through which it derives its supply of power from two bare copper conductors strained over the running rail. In some cases where the power supply is derived from a private generating plant only one trolley wire is employed, the current returning to its source of generation through the rail (suitably bonded) on which the machine runs. The maintenance charges in connection with these machines are extremely low and they work with a minimum of attention. An important though inexpensive feature in connection with the use of the mono rail telpher is the provision of a sheltered platform where the machine can be cleaned and overhauled

without exposing the men doing the work to the risk of a fatal fall. Such a provision will be found to pay for itself many times over and will ensure the telpher being well looked after.

Portable Loaders

Fig. 5 shows a particularly handy form of portable loader manufactured by Messrs. E. Bennis & Co., for the operation of which electric motors are largely used. As shown in the illustration the motor is of the back-geared type the final, drives to the elevator head being by chain. In the plant under the author's charge, portable loaders handling 1 ton of coal per minute into waggons are equipped with shunt wound 5-B.H.P. motors. Owing to the vibration to which these machines are subjected and the severe conditions under which they are usually worked, it is essential that the control gear should be as robust and simple as possible, and so far as is practicable should be accommodated on the wall stations from which loaders derive their supply of electrical energy. In the event of the whole of the control gear being accommodated away from the loader it must be remembered that a reliable form of stopping emergency switch must be installed in a handy position on the loader. Cab tyre sheathed cable forms an ideal portable lead for connecting the loader with its wall station, and each machine should be furnished with a skeleton drum for the reception of the slack of the trailing cable when working and the accommodation of the cable when out of use.

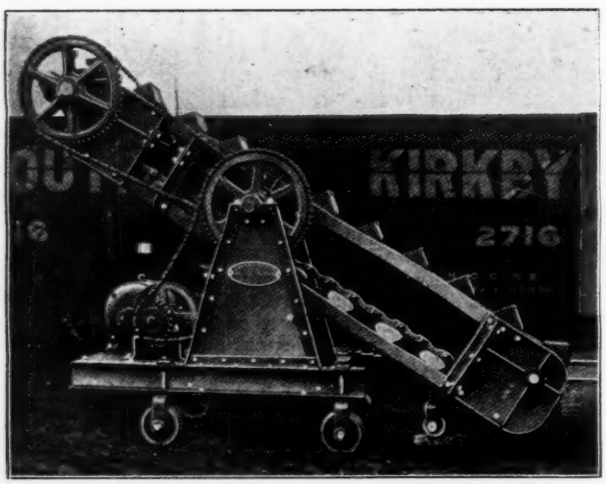


FIG. 5.

Rating of Motors

It is no exaggeration to say that 95 per cent. of the so-called failures of electrical drives are due to ill-conceived installations, improper switchgear, and to under-rating. In this last connection there is often a tendency on the part of the power user to take the word of the contracting firm as to the power required for the operation of a handling plant, and to allow them to select and supply the entire electrical equipment. This often leads to trouble as the contractor naturally provides a motor which is just large enough for its work and does not possess that margin of power which is so essential to continued satisfaction.

It is the author's practice to instal temporarily a stock motor for the working of new jobs at the start and to carefully meter the input to that motor under full load. It is then possible to make an allowance for margin of power and to purchase a motor which it is certain will be of ample capacity. The slight extra expense incurred in the putting in of the stock motor must be regarded as an insurance against under-rating. It often happens that the power taken by a handling plant is largely in excess of the figure mentioned by its builders, and for this reason alone there is a strong case for the employment of a qualified consultant both as regards the rating of the motor and the general arrangement of the drive between the motor and its load.

The following are a few of the errors which often render a first-class motor of ample capacity utterly incapable of dealing with the load for which it was purchased :—

(*a*) Absurdly small diameter driving pulleys used in the hope of saving an additional speed reduction stage.

(*b*) Belt drives of insufficient width installed for the purpose of cutting expense.

(*c*) The positive driving of a motor on to a load having a cyclical irregularity characteristic.

(*d*) The use of belts for slow speed drives which could better be handled with chain or spur gearing.

Control Gear

It is frequently the case that a good motor is handicapped and rendered unreliable by utterly unsuitable control gear installed simply because it happens to be cheap. It is a curious thing that many men will take a great deal of trouble to get a suitably rated motor and yet wholly neglect the question of rating in connection with the control gear with the result that the motor is invariably rushed up to speed because the starter happens to start smoking before it is half-way up. For serious work only good robust ironclad switchgear by reputable makers should be used and the less frillings it has the better.

Modern fool-proof devices are all right up to a certain point, but it is very difficult to wholly circumvent the human element, and in some of the more elaborate forms they are apt to defeat the object for which they were provided.

In the author's opinion money may be better spent in the installation of the remote control system of automatic starting. With this system it is possible to start or stop a machine, elevator, or conveyor, from any desired number of points, and it does not require much imagination to see what a boon this system is from the point of view of protection of life.

Many a valuable life might be saved every year if it so happened that the first witness of an accident was able to stop a machine without having to make a journey to the driving end.

In conclusion the author would point out that the prospective user of power plant should bear in mind that if he wants a trouble-free plant he should not begrudge the fee of a consultant. In many cases this expenditure proves a bagatelle as compared with the expense of putting into ultimate order an ill-conceived and badly installed plant. Having acquired a good plant the next best step for the owner to take is to engage a good man to run it for him. There are to-day far too many cases of valuable plants being left to the tender mercies of inexperienced youths and handy men whose sole qualification lies in the fact that they are cheap. In this connection it is high time that some legislation was framed with the object of making it an offence to entrust running plant in inexperienced hands.

The author desires to thank Mr. P. S. Hoyte, chief engineer of the Plymouth & Stonehouse Gas Light & Coke Co., for the courteous permission which has enabled him to publish particulars relating to the plant at the Coxside works of that Company.

Lever's American Development

According to a Central News message from Portland (Maine), the Lever Brothers Co., of Cambridge (Mass.), has increased its capital from $12,000,000 to $150,000,000, the increase being generally regarded as a step toward the acquisition of the American Linseed Co. The latter-named company was incorporated in December, 1908, in New Jersey to consolidate a number of independent mills with those of the National Linseed Co., then in process of reorganisation. The company is engaged in the business of manufacturing American and Calcutta linseed oil, raw, boiled, and refined varnish, oil cake, oil meal, and crushed flax seed. The active plants owned by the company include Dean Linseed Oil Works, the Grove Linseed Oil Works, Kellog & McDougall Works, North-Western Linseed Oil Works, Pacific Oil & Lead Works, Portland Linseed Oil Works, Sioux City Linseed Oil Works, and Wright & Hills Linseed Oil Works. It is further stated that the company owns selling and distributing stations, with an aggregate storage capacity of about 3,000,000 gallons.

The Discharge of Material in Bulk from Railway Wagons

By Herbert Blyth, M.Inst.C.E.

THE problem of handling railway-borne material at its destination is one of considerable importance—the best solution from the general economy point of view, when all charges are taken into account, is not easy to find.

The apparent gain by adopting speedy methods of unloading trucks sometimes proves to be an illusion, particularly when the means of handling subsequent to unloading are inferior in speed to that of discharging the trucks.

The problem has to be dealt with as a whole in conjunction with the requirements for subsequent disposal of the material after discharge from the trucks, otherwise it will probably be found that the capital charges of the plant will be in excess of the calculated financial gain which the rapid unloading appears to give.

There are, roughly, four distinct methods of mechanically unloading railway trucks.

(1) *Special Truck Method.*—The discharge being effected through the bottom of the truck, the bottom is formed by one or more hoppers having suitable doors which are controlled by simple hand gears. Such trucks are made for any capacity from 10 to 45 tons.

(2) *Rotary Truck Tippler.*—These are capable of handling any standard railway truck, discharging them at the rate of six to 12 trucks per hour, according to the design of tippler.

There are other well-known forms of truck tippers, suitable only for end opening wagons, but it is unnecessary to describe them in this article; it will be understood that the utility of such tippers is somewhat restricted.

(3) *Pneumatic Method.*—The material being conveyed from the truck by a current of air. This method gives a certain amount of flexibility between the truck and the discharging point, but it is not suitable for conveying the material horizontally for any great distance.

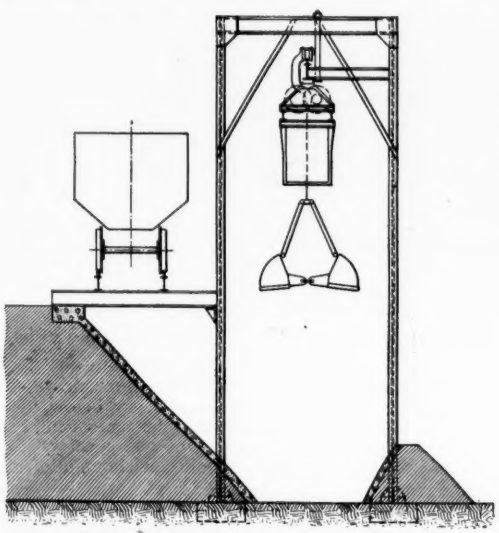


FIG. 1.—K. TYPE LOADER, SHOWING SMALL RADIUS OF OPERATION

(4) *Lifting the Material by Special Grabs direct from the Trucks.*—This method involves the use of labour for clearing out the bottom of the truck after the grab has lifted the bulk of the material (about 75 per cent. of the truck capacity).

This method, although somewhat imperfect, is not so clumsy or uneconomical as it appears at first sight.

Determining Factors

The chief determining factors in the selection of the unloading system to be adopted in any particular case are :—

(*a*) Local conditions of the site and the requirements as to handling speed.

(*b*) Capital cost depreciation and maintenance costs as compared with the saving in working costs.

Method 1.—Where the hopper trucks are available there is no need to look any further for a better method of discharging—it is quite obvious that this form of truck provides the best possible facility for unloading at the minimum handling cost.

The ideal conditions for discharging a train of hopper trucks would be :—

(1) A slightly elevated siding long enough to accommodate the whole train ;

(2) An inclined bank below the siding ;

(3) A clear space on one side for the material to be dumped upon ; and

(4) If the material has to be carried away to any distance, telpher line running immediately over the centre of the dump.

Under such conditions a consignment of, say, 400 tons, could be shunted on to the siding, discharged, and the empty trucks pulled out again within an hour. Fig. 1 suggests the arrangement.

Mr. Kelway Bamber, M.V.O. (in a very important and instructive paper read before the Royal Society in May, 1919) pointed out the saving that can be effected in time, cost of handling, and maintenance by the adoption of high capacity self-discharging wagons ; and it is interesting to note that the system is being put into service at one of the London gas works in conjunction with a high-speed telpher plant ; the whole scheme will be in operation within a few months. The trucks are being made by the Leeds Forge Company, their construction is similar to that shown in Fig. 2.

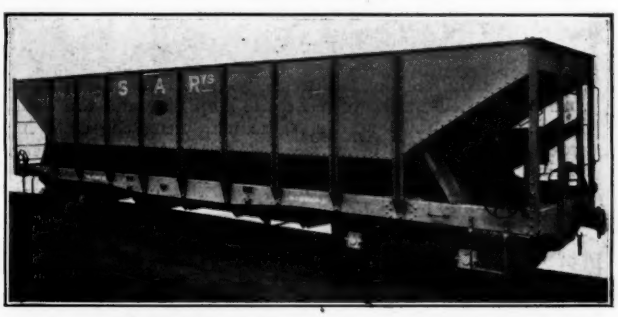


FIG. 2.—JEFFREY APRON CONVEYOR AT WORK.

This excellent system, however, involves the use of special trucks which are not generally available, and the present supply depends almost entirely upon private enterprise, hence other means of unloading have to be adopted for general purposes.

Method 2.—The rotary truck tippler comes next in importance where speed and facility of application are the chief points to consider. This machine is probably the best arrangement yet devised for dealing expeditiously with the present standard railway truck. With a good type of tippler at least twelve 10-ton wagons can be discharged within the hour, the necessary labour being one shunter and one operator for the tippler.

Messrs. Spencer & Co., Ltd., of Melksham, have devoted a good deal of attention to this question, and they have produced a reliable tippler which is capable of receiving any standard truck, automatically clamping it, turning it completely over, and restoring the truck to its original position ready for running off the tippler on to the permanent track at the rate of 12 trucks per hour.

Rotary Tipplers

The following illustrations (Figs. 3 and 4) and brief description will probably be of interest. This tippler consists chiefly of four essential parts :—

(1) Revolving cage composed of two steel rings and a sliding platform which carries the rails.

(2) Two clamping girders whose inner ends are connected to links and rollers which are capable of sliding up and down guides fixed to the cage (the outer ends carry sheaves over

which pass steel wire ropes), these ropes being attached to the cage at their inner ends, and to balance weights at their outer ends, suspended from a fixed framework outside the cage.

(3) Two bell-crank levers (with centres fixed to the cage), the inner arms of the bell-cranks are connected by the links mentioned in (2) to the clamping girders. The outer arms of the bell-cranks are free to engage with pins fixed independently of the cage.

(4) A simple train of gearing driven by an electric motor. When the rotation is started the sliding platform carries the truck by gravitation towards the side of the cage until it is

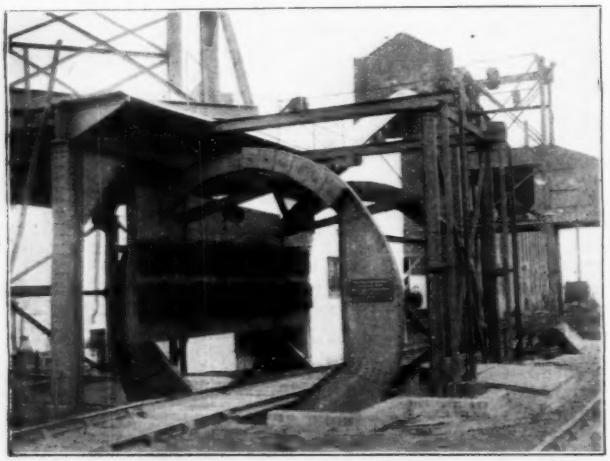


FIG. 3.

arrested by the cushion. Further rotation causes the outer arms of the bell-cranks to leave the stop pin, and the links, therefore, slide down in the frame and bring the clamping girders down on the top of the truck. As the rotation still continues the balance weights come into action and hold the outer ends of the clamping girders against the truck which is thus kept rigidly in position as the load is discharged.

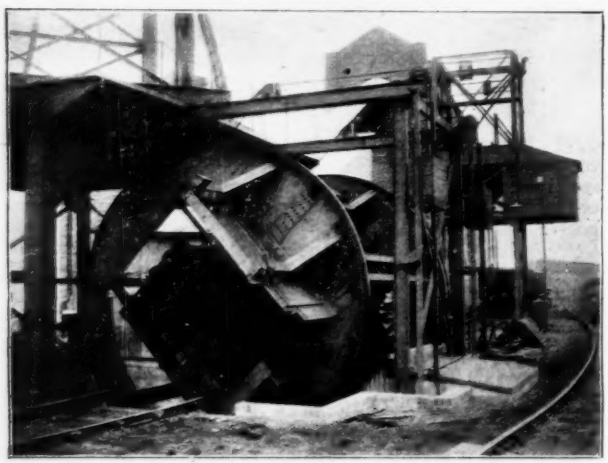


FIG. 4.

On reversing the rotation the balance weights return to the ground level, the bell cranks engage with the stop pin, the clamping girders are consequently lifted, and the sliding platform is pushed back into the normal position by the rollers (which are attached to it) coming into contact with the fixed guides.

As the tippler can only discharge the trucks at one fixed point it is very necessary—in order that its advantages may materialise—to provide a high-speed conveyor to carry the load away practically as fast as it is tipped, otherwise if the tippler has to stand idle while the pit is emptied the capital charges of the tippler might possibly exceed the working cost of discharging the trucks by some slower method which is not burdened by capital cost.

It is, of course, essential with all labour-saving machinery to ensure that it is not retarded on account of some inefficient link in the system. The efficiency of any labour-saving machine or system is only equal to that of its weakest unit.

The Pneumatic Unloader

If only a medium capacity is required, say, 20 to 30 tons per hour, the pneumatic method as arranged by Messrs. Robert Boby, Ltd., offers attractive advantages. Fig. 5 shows an application which may be briefly described as follows: The plant consists of a pump *J*, receiver *C*, swivel pipe *P*, connecting flexible hose *B*, and nozzle *A*. The pump draws a current of air through the system and the air travelling at a high velocity in the transport pipe carries the material with it into the receiver. On reaching the receiver the velocity of the air falls considerably below that which is necessary to support the material and the latter consequently falls to the bottom of the receiver, the air passing on through the top by way of the pipe *H* to the pump and out to the exhaust.

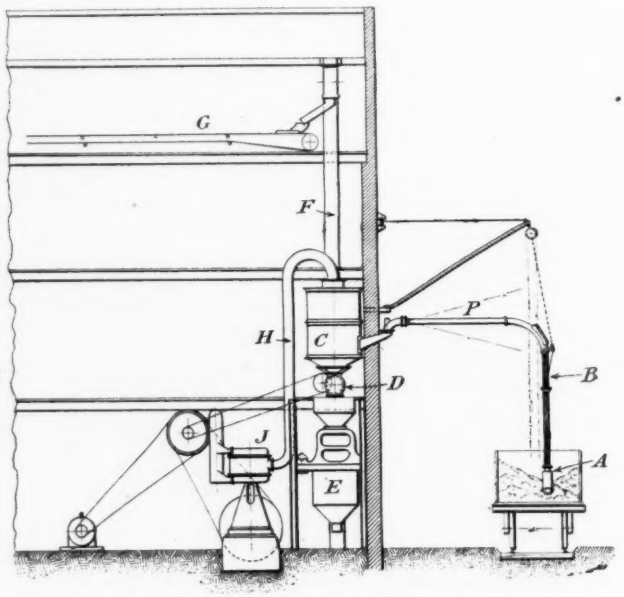


FIG. 5.—DIRECT UNLOADING BY GRAB.

The material is discharged by means of a sector-shaped rotary chamber *D*, which alternately communicates with the receiver above, and opens to free delivery below, the rotary chamber working between two air-tight faces thus receives a load of material from the vessel *C* at one point of its revolution, and discharges at another point, without allowing air to enter the receiving vessel.

The diagram indicates an automatic weigher below the discharge outlet—the weigher automatically releases the material to the elevator *F*, which delivers to the conveyor *G*. If weighing is unnecessary the receiver *C* would naturally be placed at the top of the building, or at any point to which it is desired to lift and discharge the material.

There are many cases where grabs have been used successfully for several years, unloading coal from standard trucks, for example, at Stratford Gas Works. This method is quite suitable and economical when it is desired to lift the material to, say, about 50 ft., and travel to any point in any direction, and weigh in transit, provided that only a moderate capacity is required, say, about 25 tons per hour. The chief advantages of this method are:—

(1) No capital cost beyond the cost of the transporter, which is, of course, necessary for the duty of lifting and conveying, apart from unloading.

(2) No double handling.
(3) Minimum of working parts which consist only of the transporter machine and grab.

The disadvantages are :—

(1) Only about 75 per cent. of the truck capacity can be lifted without hand labour in the truck—a trimmer must then go into the truck to clean up and shovel the last load or two within reach of the grab.

(2) The slower speed of working as compared with methods I. and II.

There are, however, many situations in which such a system can be applied with very good results, particularly where the quantity of material to be handled does not warrant a large initial expenditure.

The transporter line should be run centrally over the railway siding, and long enough to serve as many trucks as may be desired—the transporter machine is fitted with a special "non-spinning" grab having a width about 2 ft. less than the width of the truck and a span of about 7 ft. or 8 ft. The grab is lowered slowly into the truck until it just rests upon the material, and on commencing to wind up the hoisting ropes the grab automatically closes, and will take a full load provided there is sufficient depth to work in. As the grab is worked down to the bottom of the truck the grab will absolutely clean up all material within its reach, and finally if the trimmer rakes out the corners of the truck, keeping the material within the range of the grab, the remnants of the truck are quickly picked up with very little shovelling and not much loss of time.

It will not be overlooked that such a system is particularly useful and convenient when other material has to be put into the trucks—for example, the disposal of ashes from boiler station can be very well handled in this way and similarly any products or refuse from a chemical works.

In conclusion, the method of selection of the right plant for any particular condition may be stated as follows :—

(1) Consideration of the nature of the material to be handled.

(2) Unloading capacity, due regard being given to the question of clearing the trucks with a view to saving demurrage charges and also to the rapid delivery of the material in order to meet the requirements of the works which is being served.

(3) The question of capacity of the conveyor (existing or proposed) for carrying the material away from the point at which it is unloaded to that point where it is to be stored or used.

(4) Depreciation and maintenance costs of the unloading plant.

(5) The cost of labour required to work the plant.

(6) Capital cost of the installation.

All these points, and possibly others, have to be brought into account in order to select the plant which will give the desired result with the greatest economy.

Association of Chemical Engineers

DURING the last year an amalgamation has been effected between Perkins Engineers, Ltd. (late Werner Pfleiderer & Perkins, Ltd.), of Peterborough, and Joseph Baker & Sons, Ltd., of Willesden Junction, N.W., who are now making a campaign with and specialising in the production of grinding, sifting, mixing, drying and stamping machinery. Perkins Engineers, Ltd., were particularly identified with the designing and manufacture of the well-known "Universal" kneading and mixing machines which, in their various types are used in a variety of processes in the chemical and allied industries. Joseph Baker, Sons, & Perkins, Ltd., are now associated with Savy Jeanjean et Cie, of Courbevoie, pres Paris, is well-known as being that of pioneers and developers in soap and perfumery making machinery and plant. Their grinding mills, mixers, &c., were also a feature before the outbreak of the War, especially in the paint and kindred trades. These post war activities among the chemical engineers are of particular interest, and will not fail to have a beneficial effect upon the industry generally.

One of the most successful Tyneside Yuletide gatherings was the dance held by the Newcastle Section of the Society of Chemical Industry. Mr. A. Trobridge acted as secretary.

Fertilizer Loaders

A DIGGER and loader known as type G, designed especially for digging and loading hard acid phosphate, base goods and complete fertilizers is made by the Jeffrey Manufacturing Co., of Canada and America. The machine is of simple mechancial design, operated by one man.

Large wide faced supporting wheels carry the machine over rough or moderately soft ground. Rigid frame work and low centre of gravity make it hard to upset. The machine will turn a complete circle with either of the drive wheels as a centre, and can be fed straight back into a pile. It will clean up a narrow corner of a room, or work close around a post. Digger tools are spaced at intervals to the buckets to eliminate hand picking. The buckets and digging tools are wider than any other portion of the elevator boom and will dig 10 feet into a pile of solid acid phosphate before the drive wheels interfere with further movement. The elevator buckets discharge a continuous stream of material into the storage hopper, which has a capacity of one cubic yard. A quick opening valve operated by a single lever closes the lower end of the hopper. The valve jaws are powerful enough to nip off any large lump of acid phosphate should it be caught between the jaws. The arrangement of the hopper and valve enables large casts to be loaded instantly one after another. Thus fewer wheelers are required to handle the same tonnage.

K TYPE LOADER SHOWING SMALL RADIUS OF OPERATION.

The K type feeder is made on the same principle but lighter. It has a swivel chute instead of the hopper of the G type. By the chute it is possible to distribute the material as required to fill evenly the cart or truck which is being loaded from the pile.

New Calendars

THE Alsace-Lorraine Development Co., Ltd., Pinner's Hall, Old Broad Street, E.C.2, issue an attractive wall calendar for 1921, illustrated with bright, characteristic sketches of native scenes and life in the recovered provinces. Due importance is given to Alsatian potash salts, for which the company are the sole agents for the British Isles and Colonies, and advice is offered as to the application of this well-known fertiliser to agriculture.

Lévy-Haussmann, of 8, Rue Volney, Paris, dealer in oils, potash, colours, &c., sends a wall calendar in French for 1921.

Society of Chemical Industry

The Smith Continuous System of Carbonisation

AT the meeting of the London Section of the Society of Chemical Industry on Monday last a paper by Mr. G. H. Thurston was read, in the absence of the author, on "The Smith Continuous System of Carbonisation." This system has been designed and patented by Mr. Charles H. Smith, of New York, and two plants on a commercial scale are already at work at Irvington, N.J., and at Clinchfield, Virginia. The Irvington plant has been in operation for two years as an experimental and demonstration plant, and is capable of producing 100 tons of a fuel known as carbocoal per day, in addition, of course, to the other products of carbonisation processes. The Clinchfield plant has a capacity of 500 tons per day, and the retorts were started up in July, 1920, the whole of this plant being in commercial operation.

The Smith system of carbonisation has been found to work satisfactorily with non-coking coals from many parts of the United States, and tests have also been carried out on French, Brazilian and Japanese coals; whilst experiments are at the moment in progress on English coals. A Japanese company has purchased the rights for Japan, and will shortly start work there. It was stated that corbocoal briquettes sell on the same basis in America as anthracite, and 70,000 tons of them have been sold at prices ranging from $9 to $12 per short ton f.o.r. at the plant, and one individual sale of 10,000 tons has been effected at $12 per short ton. The price realised for the oils obtained in the process range from 30 to 45 cents per gallon, depending upon the tar acid content. The total cost of carbonisation and production of the briquette is put at a figure which practically equals the sale price of the briquette—namely, from £3 to £3 10s. per ton; but in addition there are obtained 18 gallons of tar distillates, 20 lbs. of sulphate of ammonia, and 11,500 cubic feet of surplus gas per ton of fuel carbonised.

Description of the Process

The process is really a combination of the low-temperature and high-temperature carbonisation. The fuel is first of all broken into small pieces and subjected to a carbonisation temperature of 480°C., for the purpose, it is said, of reducing the volatile content to a uniformly low figure. This converts the coal into a friable residue containing from 7 to 10 per cent. of volatile in from two to three hours carbonisation. This residue is then ground and mixed with a percentage of pitch, and converted into briquettes containing about 15 per cent. of volatile. These briquettes are then subjected to a temperature of from 1,000°C. to 1,100°C., which drives off all but 3 or 4 per cent. of the volatile content, and leaves the briquettes firm and hard; in fact, so hard that it is claimed by the inventor that they can be used for metallurgical processes. The tar recovered from the primary retort and the scrubbing of the gas contains usually less sulphate of ammonia than does the tar recovered by the ordinary low-temperature process; but the yield of oil from the primary retort is very high. The tar recovered from the secondary carbonisation contains a large percentage of heavy oil and pitch, and when distilled, considerably increases the total yield of sulphate of ammonia. The gas produced in the primary retort has a calorific value for from 650 to 700 B.Th.U. per cubic foot, and the quantity distilled from a 35 per cent. volatile coal is between 5,600 and 6,700 cubic feet per ton. In the secondary retort the gas has a value of from 300 to 400 B.Th.U., and the yield from the same type of coal is from 4,000 to 4,800 cubic feet per ton, and an average total of 10,630 cubic feet was given in the paper. The high-temperature, or secondary, retort is a modification of the inclined gas retort, the modification consisting of the compartments being made of the rectangular instead of the usual D type. This retort has three compartments, each containing two carbonising chambers, and it takes about six hours to deal with one charge. The primary retort is cylindrical, and 18 ft. long, and has an inverted shape. It is constituted of individual blocks of carborundum containing a special asbestos packing, the carborundum being selected after extended trials of retorts constructed of various refractory materials, in which metal was used. The end walls of the retort are cast iron lined with firebrick.

Results of Tests

The following figures were given as the result of a test on a typical high-volatile Pittsburg coal: The gas obtained from the primary retort was 5,600 cubic feet per ton, and from the secondary retort 4,480 cubic feet, making a total of 10,080 cubic feet per ton. The tar from the primary retort, containing 30 per cent. tar acids, was 22·4 gallons, and from the secondary retort 5·6 gallons, a total of 28 imperial gallons. The sulphate of ammonia from the primary retort was 2·24 lbs. and from the secondary retort 20 lbs., a total of 22·24 lbs. The 28 gallons of tar, when distilled, gave a yield of 18½ gallons of distillate, the remainder being pitch, which was used in making the briquettes. It had been found profitable to crack up the tar and get motor spirit, naphtha, tar acid and fuel oils, which could be accomplished by installing the usual by-product plant at the works. The briquettes were of such a character that they could be roughly handled, and, in addition to being valuable for metullurgical purposes, had also been found excellent for bunker fuel for ships, as well as for domestic purposes. Finally, it was claimed that this is the only continuous system in operation in the world.

Discussion

Dr. W. R. ORMANDY said that it seemed to him that the process was nothing more than the Del Monte process with two stirrers instead of one. He failed to see how, by such a system, it was possible to produce a fuel which was useful both for domestic purposes, for which it must be soft and easily burnable, and for metallurgical purposes, for which it must be hard. So far as the use of carborundum was concerned for the retorts, this had been used many years ago by Mr. Dressler for working the combustion tube of his continuous ceramic furnace, in which a temperature of from 1,500°C. to 1,700°C. was used, and where metallic material could not be used; but he personally failed to see what advantage there was to be obtained from using carborundum in the place of iron in such a process as that described in the paper.

Dr. R. LESSING said that, in spite of the views that some people held with regard to low temperature carbonisation generally, it was fairly evident from the photographs that had been shown that evening that the plant on the Smith system was being worked on a fairly extensive scale, and in addition to grants which, he understood, had been made by the American Government towards its development, it was obvious that there must be enterprising people in the United States who were willing to sink money in this enterprise.

Mr. LOMAX said that most advocates of low temperature carbonisation systems always stated that so many gallons of oil could be obtained from their process, but none of them stated whether it could be refined, nor the prices at which it could be sold. From the Smith process, he believed that the oil was of no value except as fuel oil, and the prices mentioned, of from 20 to 30 cents per gallon, were fictitious, because such a price for fuel oil was a very high one.

Mr. EDWARD, replying on behalf of the author, said there was a distinct difference between the process and the Del Monte process. With regard to metal lining, they had found that it would not stand the temperatures in the high temperature retort flue. So far as the oils were concerned, they had been able to dispose of the oil from the process in America without any trouble at all. They had not a very high percentage of tar acids, and they had been able to get out toluol and benzol by a very simple cracking process; in fact, the United States Government looked into the process during the war, and made a grant to enable a cracking plant to be put up, and toluol was supplied for making T.N.T.

Recovery of Solvent Vapours from Air

Dr. IRVINE MASSON then dealt with the recovery of solvent vapours from air, first discussing the use of cresol for ether-alcohol, then the use of sulphuric acid for ether-alcohol, and finally the general question of the analysis of liquid and gaseous mixtures of ether, alcohol and water.

Sir FREDERICK NATHAN said that the work which Dr. Masson and his colleagues had done at Gretna constituted a very important step in connection with the production of propellant explosives during the war. The explosive used for some considerable period was one in which acetone was the solvent, and the recovery of acetone from cordite had been applied commercially on a very large scale.

Sir ROBERT ROBERTSON also spoke of the work that was done at Gretna in assisting to provide explosives during the war, and mentioned that the formula which had been devised had been very successful in its practical application. There was every hope that the work done by Dr. Masson would play an important part in enabling the accurate design of plant for the purpose.

Mr. F. SPROXTON said he thought there would be greater difficulty in applying the methods to the celluloid industry, owing to the extraordinary range of thickness of that material in manufacture, ranging from 1/5,000th of an inch to ½ in.

Dr. W. R. ORMANDY said it was a most astonishing thing to see the manner in which cresol could be used as a solvent for most of the vapours which were used industrially, and he would like to know if there was any connection between the latent heat of solution and this property of cresols to absorb a large proportion of the vapours which are at present in the air.

Mr. WILLIAM MACNAB said a great debt of gratitude was owing to M. Bregeat for having discovered this property of cresol. The process had been worked on a large scale in France before they had it at Gretna, and it made a very great increase in the recovery of the solvent.

Dyestuffs (Import Regulation) Act, 1920

Applications for Licences

THE Board of Trade desire to draw attention to the fact that the Dyestuffs (Import Regulation) Act, 1920, will come into force on 15th January, 1921, and that import licences will be required in respect of any goods covered by the Act which may arrive in the United Kingdom on or after that date. Applications for such licences should be addressed to the Secretary, the Dyestuffs Advisory Licensing Committee, Danlee Buildings, 53, Spring Gardens, Manchester, and should give the following information, viz. :—

(1) Name and address of applicant.
(2) Description of goods (including the brand mark in the case of dyes) in respect of which a licence is required.
(3) Quantity and approximate value of each product required.,
(4) Name and address of manufacturer abroad.
(5) Name and address of consignor abroad and ports of shipment and arrival.
(6) Particulars of packages and marks, where known.
(7) Reasons for importation, including an indication of the purpose for which the goods are to be used.
(8) Estimated period for which the quantities in question will suffice.

At a little later date special forms of application will be available, but in the meantime applications by letter giving the above information will be considered.

The Dyestuffs (Import Regulation) Act, which prohibits the importation into the United Kingdom, except under licence, of all synthetic organic dyestuffs, colours and colouring matters and all organic intermediate products used in the manufacture of such dyestuffs, colours, or colouring matters, provides for the charge of a fee not to exceed £5 in respect of each licence issued. No remittances, however, in respect of this licence fee should be sent with the application ; the amount will be notified in each case to the firm concerned.

Recent Wills

Alderman John Batt Moorhouse, ex-Mayor of Bradford, director of the Bradford Dyers' Association, and former president of the Bradford Dyers' & Colourist Association £46635

Lord Glenconner, of Wilsford Manor, Salisbury, of Glen, Innerleithen, Peebles, N.B., and of 34, Queen Anne's Gate, S.W., chairman of Tharsis Sulphur & Copper Co., Ltd., a director of the Mysore Gold Mining Co., Ltd., and of other mining companies £819,479

Mr. L. P. Wilson, of Middleborough House, Radford Road, Coventry, research chemist..... £7,390

The Outlook for 1921

By Ernest J. P. Benn

SIR FRANCIS GOULD depicts 1920 being kicked from the scene by John Bull and saying, "Ah, you are angry with me because you know that the New Year will be no better." 1921, the third full year of peace, was ushered in with the gravest misgivings on the part of all those who are concerned with the commercial and industrial side of our activities. On January 1st, 1919, we all looked forward to great prosperity ; on New Year's Day, 1920, we still entertained the same view, but last Saturday we had begun to doubt, and it is in a condition of grave doubt that we go forward with the work of 1921. In 1921, we must, therefore, determine that we will keep up our spirits; that we will justify our claim to be practical men of business ; and that we will not allow difficulties created by the socialists and other politicians to influence our determination to keep trade and industry alive. Apart from all the fictitious barriers which are making the course more than usually difficult, the situation of the world to-day should make industry extremely busy and extremely prosperous. A boom has followed every war that ever was ; that after all is only natural because destruction must be followed by construction.

We business men have a great opportunity to-day if we will only grasp it. We must do our best in the new year to get back to work, real work, not development of theories or enunciation of principles. Little good is to be done by endeavouring to apportion the blame for the present state of affairs. We must, of course, lose no opportunity of pointing out the damage done to industry by Government control and intolerable taxation ; we must make every effort to bring Labour to an appreciation of economic truth and to help it to save its high wages by giving value. We must encourage one another to put forward that private enterprise in which we believe, and which alone can provide a higher standard of living, homes for heroes, and all the other delightful things about which the socialists and the politicians talk.

As business men we have to realise that while we have created purchasing power, we have failed to produce commodities at a price which would tempt that power to extend itself our way. We have been so much occupied with the theories of the cost of producing as to forget the much greater importance of the selling price. A united effort on the part of Capital and Labour to expedite and cheapen production would absorb all the unemployed at our gates, irrespective of our export business. All this will not be done by public agitation, by Acts of Parliament, by committees or even by our own trade associations. It will only come about as a result of the revival of an intense feeling of individual responsibility on the part of all those who call themselves business men, and who are, in fact, the persons upon whom each of us individually and the nation as a whole absolutely and entirely depend.

The Transport World

THE publication this week by Benn Brothers, Ltd., of the first issue of *The Transport World and Motor Freight Exchange*, has attracted a great deal of attention in the road carrying industry. As will be generally conceded the road transport industry is now entering upon a period of vast development and offers the very brightest prospects for enterprise on the part of all engaged in it. *The Transport World*, constituting the medium of exchange between freight producers and transport owners, will meet a great need, especially as its leading aim will be to solve the problem of the return load by making it possible for transport owners and users to utilise every running mile by means of a weekly register of freight offered and wanted.

Change of Address

THE HYDRONYL SYNDICATE LTD., of 140, Leadenhall Street, London, E.C., announce that from January 1, 1921, their registered offices have been removed from the above address to 27, Clement's Lane, Lombard Street, E.C.4. (Telephone, City 345 ; Telegraphic address, "Gallantry, Cannon, London.") From the same date the firm's technical offices will be at 317, High Holborn, W.C.1. (Telephone, Holborn 1667 ; Telegraphic address, "Pyrophoric, Holborn, London.")

From Week to Week

Swiss chemical factories are reported to be finding a ready sale for their products.

Eucalyptus oil is being distilled at a plant in the Cobargo district of New South Wales.

Reuter reports that a British company has obtained oil concessions in Thrace from the Greek Government.

On Monday night a watchman at the British Oil Cake Mills, Hull, was attacked by thieves who took £100.

Exports of rubber during 1919 from the Federated Malay States consisted of 106,453 tons, valued at $189,079,236.

As a result of the successful operation of two new sulphur domes in Texas, ample sulphur supplies are available.

Six hundred men restarted work on Wednesday at the Atlantic and Sun Patent Fuel Works, but a dispute arose and the men struck.

To mark the occasion of his retirement from the Castner-Kellner Alkali Co., Ltd., Mr. P. R. Allen was presented with a silver tea-service.

The New Jersey (U.S.A.) Chemical Society has appointed a committee to consider the advisability of forming an American Institute of Chemistry.

Men engaged on Tuesday in cleaning out a gas-holder at the works of the South Metropolitan Gas Co. found an unexploded live bomb.

Mr. W. Briggs, son of the late Mr. Briggs, chemical manufacturer, gave £50 for the entertainment of the inmates of Arbroath Poorhouse.

It is reported that Sir William Cross has completed arrangements for the establishment at Welland, Ontario, of a large chemical-fertiliser plant.

To facilitate the exploitation of the large salt deposits at Lochiel, South Australia, the construction of a railway to the deposits is receiving consideration.

The bursting of a grinding-stone at Muspratt's Chemical Works, Widnes, on Tuesday, resulted in the death of John Donaldson, superintendent of the chlorate crushing machine.

Radium in payable quantities has been discovered in Madagascar. According to the French Press it is thought that as much as one gramme may be extracted from ten tons of ore.

A new company under the style of Socieda General dei Colori has been formed in Milan for the manufacture of aniline dyes.

At an inquest last week on Henry Greatorex, of Earlston Road, Wallasey, retired chemist, a verdict of death from natural causes was returned.

During the year ended June 30, 1920, the Australian Commonwealth spent £19,845 on the development of Papuan oil fields.

The Ministry of Munitions has granted a licence to Mr. Reginald Gilbey, of Nottingham, "to search and bore for and get petroleum" at Weston, Leicestershire. The area covered by the licence extends to 354 acres.

Official analyses made of oil from the well sunk at Fort Norman, in the Mackenzie River region (Canada), show that it is lighter in petrol than the Southern Alberta oils, but much the same as far as illuminating oil is concerned.

Mr. David Owen, B.A., D.Sc., senior lecturer in physics at the Birkbeck College, has been appointed head of the department of physics and mathematics at the Sir John Cass Technical Institute.

A Saltpetre Producers' Association, comprising 98 per cent. of the saltpetre producers of Chili, has been formed with a view to limiting production and fixing the selling price of saltpetre up to January, 1924.

Operations during November at the cyanamid plant and at the phosphate mines of the American Cyanamid Co. were at full capacity, but slackened demand resulted in half-capacity operations at the ammo-phos plant.

A solution of benzol containing 15 per cent. of napthalene has a calorific value about 3.3 per cent. above that of benzol itself, according to experiments made recently on the value of napthalene fuel for motor car engines.

The Council of the Rubber Growers' Association have cabled supporting a request made by the rubber growers in Malaya to the local authorities for legislation to restrict production of rubber by 50 per cent.

The Swedish Sugar Refining Co. has terminated the agreement at its sugar refineries and made proposals for a new agreement which includes a reduction in wages of 16 œre an hour for a man and 12 œre for a woman.

Rubber imports for the week ended Tuesday totalled 1,830 tons, against which has to be offset deliveries of 640 tons. With the latest addition the total surplus of raw rubber in London alone stands at 50,219 tons.

Sir Jesse Boot, who has given £200,000 for the construction of a new road between Nottingham and Beeston, is still in poor health and is obliged to remain in the south of France. He will therefore be absent from the wedding of his daughter on January 18.

The Société de Saint Gobain, which has increased its capital from 60,000,000 francs to 120,000,000 francs, is stated to be financially interested in the Claude process of synthetic ammonia. It is understood that the Société will build a new plant in Strassburg.

A method of producing liquid coal is reported to have been invented by an American. The gases are distilled in an oil, which for burning purposes is sprinkled on an asbestos foundation. This system, it is claimed, increases the burning capacity of a ton of coal by 50 per cent.

The Danish Justitoministeriet has removed the prohibitions regarding the export of vegetable oils for use in the manufacture of margarine, copra, sesamum seed, vegetable stearine, linseed, soya beans, margarine, palm kernels and cotton seed.

The by-products plant which is in course of erection for the North Navigation Collieries, Ltd., Tondu, is nearing completion. Fifty new coke-ovens by the Coppee-British Co. are now in use for the production of sulphate of ammonia and tar by-products. Fifty more of these ovens are to be installed.

General Science has been added to the optional subjects for candidates for the Royal Military College, Sandhurst, at the Army Entrance Examination. The subject of general science will be alternative to physics and chemistry. No candidate will be allowed to take up physics and chemistry as well as general science.

Mr. Leonard P. Wilson, of Middlesbrough House, Radford Road, Coventry, research chemist, left gross estate of the value of £7,390, with net personality, £6,583. He was chief chemist at Courtauld's, Coventry, and was appointed at the beginning of the present winter session Chairman of the Birmingham and Midland branch of the Society of Chemical Industry.

Mr. Leonard E. Hinkel, on his appointment as lecturer in chemistry at University College, Swansea, has resigned the position of assistant to the Board of Examiners of the Institute of Chemistry, which he had held for the past thirteen years. The Council have expressed their appreciation of and their cordial thanks for his services. The duties of the examiners' assistant will be undertaken by Mr. G. S. W. Marlow, assistant secretary.

Reuter states that the Government of St. John's, Newfoundland, announces the completion of an agreement with the Anglo-Persian Oil Co., whereby the company undertakes to prospect all ungranted Crown lands in the Colony during the next five years at the company's expense. The Government in return undertakes not to grant any mineral areas to other parties during this period.

The Council of Cambridge University Senate report that under the scheme submitted by the trustees of the late Sir William Dunn, which was approved by the High Court of Justice, and accepted by the Senate last June, £165,000 was offered to the University for the endowment of a school of biochemistry. The endowment scheme provides that £25,000 be set aside as a permanent endowment for a professorship, and £10,000 as a permanent endowment fund for a readership. The Council recommend that the professorship shall be called the Sir William Dunn Professorship of Biochemistry, that the electors shall be the Vice-Chancellor and eight other persons elected by the Senate, that the special board of studies to which the professor is assigned shall be the Special Board for Biology and Geology, and that the stipend shall be the income yielded by the sum of £25,000, invested in Government securites.

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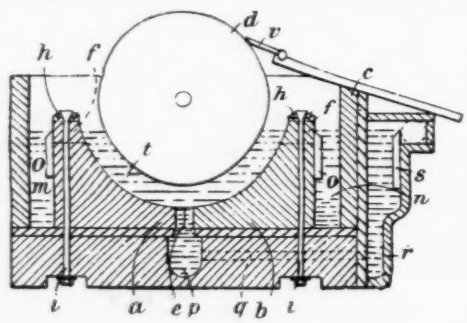
Patent Literature

Abstracts of Complete Specifications

154,635. ELECTROLYSIS. M. A. Adam, 57, Lincoln's Inn Fields, London, W.C.2, J. Stevenson, 28, Talbot Road, Bayswater, London, W.2, A. T. Mabbitt, 3, Wallwood Road, London, E.11, and J. Fieldhouse, 2, Byfield Road, Walthamstow, London, E. Application date, February 27, 1919.

The apparatus is for the electrolytic deposit of metals in non-coherent or loose crystalline form from solutions of metallic salts, in a cell having a rotating cathode. In an example applied to the electrolytic recovery of tin from iron chloride solutions rich in stannous chloride, the cell *c* is provided with two graphite anodes *a*, *b*, placed side by side and running the full length of the cell. The bars are hollowed



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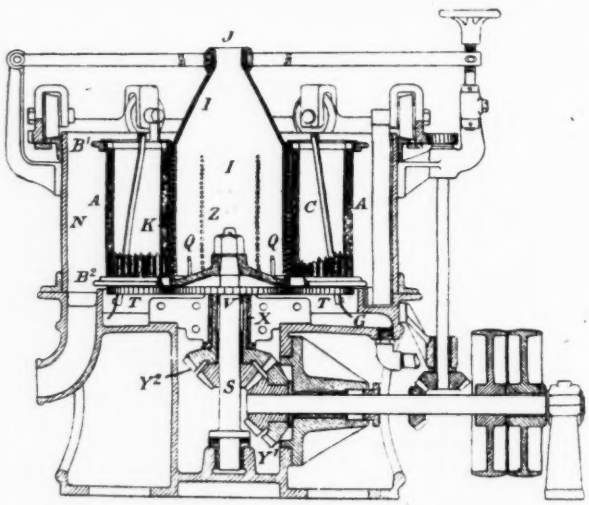
out to form a circular trough concentric with the rotating cathode drum *d*. The electrolyte is supplied continuously to the chambers *m*, *n*, and flows over the adjustable weirs *o* and notches *f* to the annular space *t*. The electrolyte then flows through openings *e* to a trough *p* and thence through passages *q* to a chamber *r* having an overflow weir *s*. The current is conducted to the anodes through bolts *i* and cross-bars *h*. The anode and cathode are impregnated with paraffin wax to exclude the electrolyte from the pores. The metallic deposit is continuously removed by a scraper *v*. It is found that satisfactory results can be obtained with a cathode current density of about 2·5 amperes per square inch.

154,656. PHENOLIC BODIES, CONDENSATION OF—WITH ALDEHYDIC COMPOUNDS. Vickers, Ltd., Vickers House, Broadway, Westminster, London. The Ioco Proofing Co., Netherton Works, Anniesland, Glasgow, and W. H. Nuttall, The Ioco Proofing Co., Ltd. Application dates, July 29 and December 15, 1919.

The object is to eliminate water from phenol aldehyde condensation products so as to render them suitable for use as electric insulators. The condensation is carried out or completed by the use of condensing agents which react with the water produced, such as metallic carbides, nitrides, silicides, phosphides and cyanamides, especially calcium cyanamide. In one example, after the condensation of the phenol with commercial formalin or the like, the lower gum layer of the liquid is withdrawn and treated with one of the condensing agents mentioned, which removes the last traces of water. The gum when heated is converted into a hard, insoluble, and infusible product. Alternatively, the ordinary alkaline and acid condensing agents are dispensed with and the condensing agents mentioned above are used throughout the process.

154,641. CENTRIFUGAL MACHINE FOR FILTERING OR EXTRACTING LIQUIDS, SEMI-LIQUIDS AND OTHER SUBSTANCES. J. McIntyre, 28, Brighton Place, Portobello, Midlothian, Scotland. Application date, May 30, 1919.

A number of cylinders *A* are covered with gauze or filter cloth, and are fixed to discs B^1, B^2, arranged in a circle above the axis of the shaft *S*. A vessel *I* open at the top rotates with a casing *K* carried by the shaft *S*, but is capable of longitudinal movement with respect to it by means of keys *Q* moving in slots. Slots or openings *Z* are provided in the vessel and in the casing, and may be brought into or out of register by longitudinal movement. The cylinders *A* are rotated on their own axes by means of the bevel wheels Y^1, Y^2, sleeve *X*, and spur wheels *V*, *T*, the drive being independent of the shaft *S* which drives the discs B^1, B^2. The shaft *S* and spur wheel *V* rotate in the same direction, but at different speeds, and the cylinders *A* may be rotated in the same or the



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opposite direction to that of the shaft *S*. The liquid is introduced through the opening *J* and passes through the openings *Z* by centrifugal force on to the circumference of the cylinders *A*. The liquid passes through the filtering medium and is deflected by the plates *C* into the trough *G* while the solid material is retained on the filtering medium and then thrown off by centrifugal force to the casing *N*.

154,658. CARBONACEOUS MATERIAL, APPARATUS FOR TREATING—FOR THE RECOVERY OF VOLATILE HYDROCARBON CONSTITUENTS. C. C. Bussey, 12, Gates Avenue, Brooklyn, New York. Application date, July 29, 1919.

In an apparatus for the low-temperature distillation of coal, lignite, shale and the like, for the recovery of volatile hydrocarbons, the material is continuously supplied through the top of a vertical retort of increasing diameter downwards, and is discharged at the bottom at opposite sides of the grate alternately. The ejector consists of a horizontal bar which is traversed across the grate and just above it. The grate is supported at the top of a hopper of larger diameter so that a quantity of the material is moved off the grate into the hopper at each reciprocation of the bar. The bar may be water-cooled internally, and its two ends are moved in parallel guides at opposite sides of the retort by means of feed screws. The maximum temperature of the charge near the grate is maintained below the cracking temperature of the oil products, and the hydrocarbon constituents are driven off from the fuel in the upper part of the retort solely by the heat generated by partial combustion of the material at the base of the retort. Crude oil and ammonia are obtained in preference to a tar product.

154,680. ACETIC ACID, MANUFACTURE OF. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, August 28, 1919.

The object is to produce acetic acid by oxidation of liquid acetaldehyde by subjection to oxygen or a gas containing free oxygen such as air, in the presence of a catalyst. It is

found that the inorganic matter contained in animal charcoal, especially the calcium and magnesium phosphate, acts as a satisfactory catalyst. The catalyst is produced by burning out the carbon from animal charcoal, or by mixing the constituents of such residues artificially, *i.e.*, calcium and magnesium phosphates with or without lime, silicon dioxide, and fluorides, in such quantities as they usually occur. Sodium acetate may also be added. In an example, a mixture of acetaldehyde, 200 parts, charcoal residue, 5 parts, and sodium acetate, 5 parts, is treated with oxygen at 10°-20°C. and the glacial acetic acid subsequently crystallised out or distilled off. In an alternative, the charcoal residue may be replaced by a mixture of calcium phosphate, 95 per cent., and magnesium phosphate, 5 per cent.

154,718. LEAD AND ZINC, TREATMENT OF SULPHIDE ORES CONTAINING. P. A. Mackay, 70, Lombard Street, London. Application date, September 4, 1919.

It is found that the lead sulphide may be converted into lead sulphate without the use of heat by treatment with sulphuric acid containing free sulphur trioxide in solution. The finely ground ore is passed continuously through a rotating cylinder, and sulphur trioxide gas (obtained directly from a contact oleum-process plant) is passed through in the opposite direction in such quantity as to set up an exothermic reaction and maintain the temperature at about 100°C., so as to convert the lead sulphide into sulphate. The zinc remains as sulphide throughout the operation. If the ore contains silver in addition, lead and silver sulphate are obtained and the silver sulphate may be dissolved out with water. If cadmium or bismuth is also present it is converted into the sulphate, which is readily separated from lead sulphate. The zinc sulphide and lead sulphate are separated by the flotation process, or by a gravity separation process. The treatment described eliminates the usual roasting or calcining process.

154,762. EVAPORATING PROCESSES. J. C. Stead, 57, Chancery Lane, London, W.C. 1. Application date, October 14, 1919.

A pair of horizontal drying rolls are mounted with their axes parallel and their surfaces nearly in contact, and liquid to be evaporated is introduced into the V-shaped space between the rolls. A casing surrounds the lower part of each roll, and a trough is arranged centrally between the two casings with its edges connected to the inner edges of the casings. A suction pipe is connected to the trough so that air is drawn through the two casings into the trough. The air passages are so proportioned that the air is directed upwards towards the opening between the rolls in opposition to the rotation of the rolls carrying their film of liquid. The rolls are heated internally, and the dried material is removed by a scraper. Any liquid dropping into the trough is drawn off at one end.

154,810. POTASSIUM BICHROMATE AND SODIUM BICHROMATE, MANUFACTURE OF, AND PRODUCTION OF NORMAL SULPHATES OF POTASSIUM AND SODIUM. R. L. Datta, 78, Manicktola Street, Calcutta. Application date, January 5, 1920.

The object is to manufacture potassium or sodium bichromate from the corresponding chromate. A saturated potassium chromate liquor is heated and potassium bisulphate cake in a divided condition is added. The chromate is converted into bichromate and normal potassium sulphate is produced. The solution is filtered and evaporated, when potassium sulphate first crystallises out, and may be used for the production of bisulphate for treating a further charge of chromate. The potassium bichromate is then crystallised from the mother liquor.

NOTE.—The following specifications which are now accepted were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 127,255 (R. Cataldi), relating to electrolytic decomposition of chlorides, *see* Vol. I., page 201; 130,962 (E. I. Du Pont de Nemours & Co.), relating to recovery of solvents, *see* Vol. I., p. 504; 140,371 (Nordiske Fabriker De-No-Fa-Aktieselskap), relating to hydrogenation of unsaturated organic compounds, *see* Vol. II., p. 562.

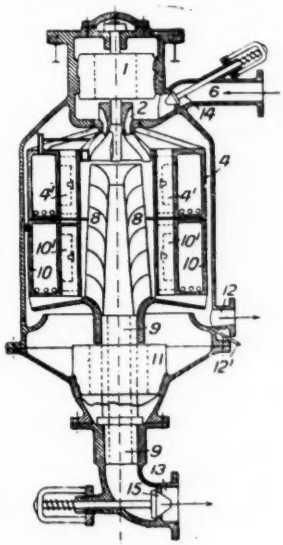
International Specifications Not Yet Accepted

152,602. CALCINING FURNACES. A. Bigot, 112, Avenue de Duffren, Paris. International Convention date, October 15, 1919.

A furnace adapted more particularly for calcining gypsum is provided with inner walls and top of thin reinforced concrete. These walls are surrounded by a layer of stacked bricks or similar heat absorbing material, and this by an outer wall of heat insulating bricks. The top is covered by a powdered heat insulator. The furnace is in the form of a vertical shaft in three sections of decreasing diameter, and openings are provided in the inner walls at intervals to afford communication between the interior and the hollow walls. The shaft is provided with feed mechanism at the top and discharge rollers at the bottom. A tunnel furnace is also described, and the invention is applicable also for drying clays, dehydrating gypsum, and treating bicarbonate of soda or silico limestones.

152,643. OXYGEN AND NITROGEN, SEPARATING. M. Zack, 24, Plattenstrasse, Zurich, Switzerland. International Convention date, October 15, 1919.

A mixture of oxygen and nitrogen passes through the pipe 6 to the centrifugal blower 2, driven by an electric motor 1, and is delivered downwards. An annular ring 4 is carried by the blower, and is filled with liquid air, while electromagnets 4′ are attached to the inner side. The gas mixture is thus subjected to the influence of low temperature, centrifugal force, and a rotating magnetic field, and oxygen is separated and thrown outwards. The nitrogen passes into a centripetal pump 8, driven by an electric motor 11, and carrying a similar ring 10 with magnets 10′. The nitrogen is delivered through the hollow shaft 9 to the outlet 13. The oxygen passes downwards along the rings 4, 10, to the outlet 12, and any liquefied gas is drawn off by the pipe 12′. The passage of the oxygen from the ring 4 to the ring 10 is facilitated by the periodic interruption of the current and closing of the valves 14, 15. In a modification, fixed magnets are used, and the rotating field is produced by the use of a polyphase current.



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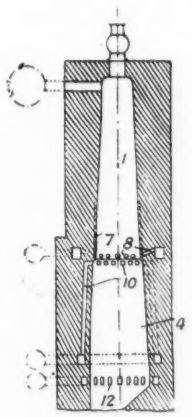
152,650. DESTRUCTIVE DISTILLATION. Colombo and Ing. de Bartolomeis and R. de Bartolomeis, 7, Via Napo Torriani, Milan, Italy. (Assignees of Soc. Italaian Asfalti, Bitumi, Catrami, E. Derivati, A.B.C.D., Rome.) International Convention date, October 18, 1919.

Wood, shale, or lignite is fed into the top of a vertical retort 1, which is heated at its central zone 7 only, and the coke is cooled in the lower part 4. The central zone may be heated electrically, or preheated gas may be injected through a ring of openings 8, or air may be passed through passages 10 in the lower walls to another ring of openings. Gas and steam may be injected at the bottom of the retort 12, to transfer the heat from the coke to the upper part of the retort.



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155,792. Recovery of zinc by electrolysis. Electrolysis Zinc Co., December 24, 1919.

155,775. Method of manufacturing acetaldehyde from acetylene. Stockholms Superfosfat Fabriks Aktiebolog. December 22, 1919.
155,776. Process for effecting chemical reaction in the interior of compressors. Brutz-Rus, M. December 22, 1919.
155,781. Process for the manufacture of preparations of calcium iodide fit for therapeutic purposes. Spitz, W. March 10, 1916.
155,782. Process for producing fatty acids of high purity and melting point. Starrels, J. March 1, 1916.
155,786. Rotary Pumps. Thirion, J. A. September 21, 1918.

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132,789. Grinding, crushing or pulverising, Mills for. S. Sokal. (*Naamlooze Vennootschap Verschure & Co.'s Scheepswerfen Machine-fabriek*). September 30, 1919.
134,529. Low-temperature distillation of coal. N. Young. November 1, 1918.
139,160. Zinc, Electric furnaces for the production of. B. Rader and Aktieselskabet Zink. February 15, 1919.
139,451. Water-gas producers. F. G. C. Rincker. February 24, 1919.
142,081. Magnesium hypochlorite, Process for the production of solid basic. G. Kereszty and E. Wolf. April 19, 1919.
142,507. Paraffin wax, Treatment of, for the production of oxygenated compounds. A. Schmidt. January 15, 1916.
144,728. Extracting metals from metallic compounds, ores, foundry products, furnace dust and the like. F. Krupp Akt.-Ges. Grusonwerk. June 3, 1919.
148,579. Sulpho-acids and alkyl-sulphuric-acids, Process for obtaining the salts of, from acid resins. Sudfeldt & Co. March 14, 1919.
155,313. Ammonia, Production of. A. Rollason. June 17, 1919.
155,316. Coking-retort ovens. W. J. Mellersh-Jackson. (*Koppers Co.*). June 23, 1919.
155,319. Nitro-compounds, nitroso, and azo compounds, Reduction of substituted. T. S. Moore. July 14, 1919.
155,349. Froth-flotation process, Apparatus for the. L. A. Wood and Minerals Separation, Ltd. September 11, 1919.
155,373. Acid pots, to be employed in the production of white lead, Manufacture of. H. T. Arrowsmith. September 17, 1919.
155,410. Disazo colouring-matters, Manufacture and production of. Brotherton & Co. and R. W. Merriman. October 11, 1919.
155,457. Electrolytic apparatus. I. H. Levin. December 31, 1919.
155,511. Volatile liquid, Apparatus for separating, from solution in a relatively non-volatile liquid. W. K. Lewis and W. Green. January 31, 1919.
155,522. Mineral residues, Process for the conglomeration of, in a pulverulent condition. L. Ayestaran é Irazusta. June 29, 1920.

Applications for Patents

Aluminium Co. Method of manufacturing aluminium chloride. 36,516. December 30. (United States, May 26.)
Atack, F. W. Fusion of organic substances with alkalies. 36,581. December 31.
British Dyestuffs Corporation. Peacock, D. H. and Segaller, D. Manufacture of oxy and sulpho-oxy derivatives of anthraquinone. 36,536. December 30.
Broadbent, H. Centrifugal machines. 36,454. December 30.
Chemische Fabrik Flora. Manufacture of silver-thioglycolate of sodium. 36,377. December 29. (Switzerland, November 12, 1919.)
Cook, D. Chemical and physical synthesis. 36,612. December 31.
Earp, W. R. Soap manufacture. 36,582. December 31.
Haddock, J. Manufacture of lactyl-salicylic acid. 36,285. December 29.
Harger, J. Manufacture of hydrogen and mixtures of hydrogen and nitrogen. 36,456 December 30.
Kinney, J. R. Rotary pumps. 36,390. December 29. (United States, March 4, 1914.)
,, Apparatus for spraying tar, &c. 36,657. December 31. (United States, July 1, 1915.)
Koppers Co. Manufacture of ammonium sulphate. 36,664. December 31. (United States, May 10, 1918.)
Moulin, R. Apparatus for diffusion of essence or volatile liquids. 36,644. December 31. (France, June 14, 1919.)
Plauson, H., and Vielle, J. A. Manufacture of diolefines and/or polymerization products thereof. 36,457. December 30. (Germany, April 23, 1918.)
,, Manufacture of vinyl compounds, and polymerization products thereof. 36,458. December 30. (Germany, May 24, 1918.)
,, Manufacture of rubber-like substances. 36,459. December 30. (Germany, October 31, 1918.)
,, Manufacture of rubber-like substances. 36,460. December 30. (Germany, December 2, 1918.)
,, Manufacture of vinyl halides. 36,461. December 30. (Germany, September 9, 1918.)
Plauson, H., and Vielle, J. A. Manufacture of alkyl ethers of vinyl alcohols and homologues thereof. 36,462. December 30. (Germany, May 24, 1918.)
,, Manufacture of diolefines and derivatives thereof. December 30. 36,463. (Germany, December 8, 1919.)
,, Extraction of carbonaceous substances or hydrocarbons. 36,464. December 30. (Germany, April 23, 1918.)
,, Manufacture of phosphatic manures. 36,465. December 30. (Germany, November 5, 1919.)
,, Manufacture of hexamethylene tetramine. 36,548. December 31. (Germany, September 9, 1919.)
,, Manufacture of plastic masses. 36,549. December 31. (Germany, March 15, 1919.)
,, Extraction of montan wax from bituminous coal. 36,550. December 31. (Germany, December 2, 1918.)
,, Manufacture of low-boiling chlorinated hydrocarbons. 36,551. December 31. (Germany, December 8, 1919.)
,, Manufacture of lubricating oils. 36,552. December 31. (Germany, December 12, 1919.)
,, Obtaining and oxidizing paraffins, &c., and obtaining soaps therefrom. 36,553. December 31. (Germany, June 4, 1919.)
,, Manufacture of dispersoids, colloid powder, and masses therefrom. 36,554. December 31. (Germany, August 29, 1918.)
,, Manufacture of rubber and ebonite substitutes. 36,555. December 31. (Germany, February 25, 1918.)
,, Manufacture of rubber and ebonite substitute. 36,556. December 31. (Germany, December 13, 1919
,, Manufacture of di-ols and diolefines. 36,557. December 31. (Germany, September 18, 1916.)
,, Oxidation of acetaldehyde to acetic acid. 36,558. December 31. (Germany, July 5, 1918.)
,, Manufacture of acetaldehyde or acetic acid. 36,559. December 31. (Germany, September 6, 1918.)
,, Manufacture of formaldehyde and methyl alcohol. 36,560. December 31. (Germany, September 9, 1919.)
,, Manufacture of paintable compositions. 36,561. December 31. (Germany, April 23, 1918.)
,, Reclaiming waste rubber. 36,562. December 31. (Germany, April 23, 1918.)
,, Manufacture of resinous condensation products. 36,563. December 31. (Germany, May 24, 1918.)
,, Manufacture of acetaldehyde or acetic acid. 36,564. December 31. (Germany, January 28, 1919.)
,, Improving odour, taste, and digestibility of raw yeast. 36,565. December 31. (Germany, March 16, 1919.)
Prater, E. P. Oxy-acetylene torch valves. 36,307. December 29.
Shimadzu, G. Lead oxides, and manufacture of same. 30,519. December 30.
Soc. l'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. Synthetic production of ammonia. 36,533. December 30. (France, December 30, 1919.)
Woodcraft Manufacturing Co. Manufacture of hydrogen and mixtures of hydrogen and nitrogen. 36,456. December 30.

South African Carbide and By-Products Co., Ltd.

THE annual meeting was held on December. 30. Sir Cecil Partridge, who presided, said that circumstances had arisen since the last meeting over which neither the directors nor the various contractors employed by them had had control, by which the company's programme had been considerably retarded. The directors had determined to push on with the greatest possible speed the carbide side of the company's business, and, in order that production might be secured as early as possible, the consulting engineers had been requested to concentrate for the time being upon the construction and equipment of the carbide factory and power station, and it was confidently expected that these sections would be in full working order in six or eight months' time. The progress made in connection with the producer and low-temperature sections led the directors to anticipate that a portion of this plant would be in operation at an early date after the carbide section commenced working, so that he hoped at the next meeting to be able to give the shareholders a report of their business justifying the confidence the directors had in future success of the undertaking. The market price of carbide in South Africa had very much increased, and, although working and transport costs had shown a similar tendency, the directors anticipated that the profits accruing to the company would exceed their original estimate. Sir Dennis Bayley, who had recently returned from a visit to South Africa, reported the work on the carbide and by-product factory at Ballengeich to be well in hand.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, January 6.

Markets at last show some slight signs of revival after the complete stagnation which has been apparent since Christmas time.

There is very little actual business passing, but enquiries are circulating, and whilst we do not think that very much can be hoped for during the next few weeks, the tendency is a little better.

The export situation goes from bad to worse, consequent upon the continued depreciation of most of the foreign currencies.

General Chemicals

ACETONE is unchanged in price. Stocks are passing steadily into consumption.

ACID ACETIC has not been in quite such good demand, but there does not appear to be any material change in value.

ACID CARBOLIC shows perhaps a slightly better tendency, but the price is nominal and practically no business is passing.

ACID FORMIC.—A certain amount of hand-to-mouth buying is reported, but there is no weight of business, and the price is easy.

ACID OXALIC is again rather lower in price, and the demand leaves much to be desired.

ACID TARTARIC is a little lower in consequence of increased Continental offerings. There are still considerable stocks.

BLEACHING POWDER is still on offer from the Continent, but little business is reported.

COPPER SULPHATE is a declining market, and business is rendered almost impossible by the exchange situation.

FORMALDEHYDE is in steady demand for spot delivery. The volume of trade is below the normal. Price unchanged.

LEAD SALTS are practically lifeless, and do not present any point of interest.

MAGNESIUM SALTS remain an easy market, and the price tends to favour buyers.

POTASSIUM CARBONATE is again lower in price, but little business is passing.

POTASSIUM CAUSTIC is in a similar position.

POTASSIUM PRUSSIATE.—Stocks are very small and any improvement in demand would quickly affect the general situation.

SODIUM ACETATE is only a nominal market, and the tendency is easy.

SODIUM CAUSTIC is again lower in secondhands, and orders are few and far between.

SODIUM BICHROMATE has been reduced to a price which appears to have no relation to the cost of production. When various reductions of secondhand holdings are completed, a different level of prices can be expected.

SODIUM HYPOSULPHITE is slow in demand, but no change in price is evident.

SODIUM NITRITE is again a weaker market, and demand is only nominal.

SODIUM PRUSSIATE.—Larger quantities are on offer both of English and Continental make, and whilst manufacturers maintain that prices are unattractive, the absence of demand presents a serious problem.

ZINC OXIDE.—A moderate business is reported at recent rates.

ZINC SALTS remain uninteresting.

Coal Tar Intermediates

The market continues in a lifeless condition, although there are slight indications of more interest being taken in one or two products.

ANILINE OIL.—Only a small amount of business is passing at current prices.

BETA NAPHTHOL is without change in value. Offers of Continental material are not so much in evidence.

DINITROCHLORBENZOL is only in slight demand, but the price is firm.

DIMETHYLANILINE is an easy market with little business passing.

NAPTHIONATE OF SODA is in slightly better demand, but the business reported is only of slight dimensions.

PARANITRANILINE is idle, although the price is maintained.

RESORCIN is a shade easier for the technical article, due to the lack of demand.

SALICYLIC ACID is lifeless and the market continues in buyers' favour.

Coal Tar Products

The market for all coal tar products remains quiet, and there is little new business doing.

90's BENZOL.—The price of this article has fallen in sympathy with the falling price of petrol, although not to the same extent as that article. Benzol is worth 2s. 10d. on rails in the North, and 2s. 11d. to 3s. on rails in London.

PURE BENZOL is quiet and is quoted at 3s. 3d. to 3s. 4d.

CREOSOTE OIL is somewhat easier and is worth 1s. 1d. per gallon on rails in the North, and 1s. 2d. to 1s. 3d. in the South.

CRESYLIC ACID shows no improvement, Dark 95/97 per cent. being quoted at 3s. 6d. to 3s. 9d., and 97/99 per cent. at 3s. 9d. to 4s.

SOLVENT NAPHTHA is quiet at 2s. 9d. to 3s. on rails at the works.

HEAVY NAPHTHA is slightly more active, and is worth 3s. 3d. on rails.

NAPHTHALENE remains weak, crude qualities being worth £12 to £20 per ton, and refined from £30 to £35.

PITCH.—The market remains dull and inactive.

Sulphate of Ammonia

There is no change in the position.

French Market Report

This market is quite normal and practically no business is passing.

The following may be taken to be the ruling figures, although doubtless with firm business they could be shaded.

ACID ACETIC 80 per cent. technical, 490 frs.
ACID OXALIC, 950 frs.
ACID TARTARIC, 400 frs.
ALUMINA SULPHATE, 92 frs.
COPPER SULPHATE, 220 frs.
FORMALDEHYDE, 900 frs.
LEAD ACETATE, 420 frs.
LEAD NITRATE, 450 frs., with little business passing.
POTASSIUM PERMANGANATE is slow at 20 frs. per kilo.
POTASSIUM PRUSSIATE, 1050 frs.
POTASSIUM CYANIDE, 30 frs.
SODIUM HYPOSULPHITE, 100 frs., with only a moderate inquiry.
SODIUM NITRITE, 325 frs.
SODIUM PRUSSIATE, 670 frs.
SODIUM SULPHIDE CONCENTRATED, in small request at 205 frs.

The above prices are per 100 kilos.

German Market Report

Business in Germany continues to decline, and has now shrunk to very small proportions, and that in the main on export account.

Many products have further declined in price, and as is the case with other markets, the position is largely governed by figures quoted by secondhands.

ALUM is quiet and the price is about 2 marks per kilo.

ALUMINA SULPHATE is weak and is standing at about 230 marks per 100 kilos.

AMMONIA CARBONATE is quiet and is standing at about 6 marks for home trade only.

ACID OXALIC is little in request and is quiet at 26 marks per kilo.

FORMALDEHYDE is in small request, and can be obtained at about 23 marks.

LEAD SALTS are all on the quiet side, with little business passing.

POTASSIUM CYANIDE is in fair request at about 32 marks per kilo.

POTASSIUM PERMANGANATE continues stagnant at about 50 marks per kilo.

POTASSIUM PRUSSIATE is idle, and there are very few enquiries in the market on export account.

SODIUM CAUSTIC is enquired for, but little business appears to have been transacted.

SODIUM CYANIDE is a weak market at 30 marks per kilo.

SODIUM SULPHATE is in fair request at about 330 marks per 100 kilos.

SODIUM HYPOSULPHITE is moved fairly well at about 4.50 marks.

SODIUM SULPHITE has again declined and the price is now about 7 marks per kilo for the concentrated quality.

Manchester Chemical Trade

Prices and Conditions of the past Year

THE monthly circular issued by Sir S. W. Royse & Co., Ltd., takes the form largely of a review of prices and conditions during the past year, as will be seen from the following extracts :

Chemicals

The period of good trade which commenced in the autumn of 1919 extended over practically the first half of the present year. During its continuance stocks were small and manufacturers were on the whole kept fully employed and the increasing cost of fuel, labour and raw material made it necessary for them to act with caution with regard to forward commitments. Consumers also were busy and taking full quantities on contracts. During the summer, business began to fall away and the position has gradually become worse, and with the consequent more or less considerable decline in the prices of most products, there has been an increasing tendency for consumers to buy only their current needs. The transport position is far from satisfactory though it is better than it was twelve months ago. The rates of inland carriage were increased in January and further advanced at the beginning of October. The demands of labour have been insistent and the repeated strikes and threats to strike have made matters very difficult.

The export trade was very brisk in the early part of the year, but it has since been gradually curtailed by difficulties of finance, variations in exchange, &c., and exporters have latterly had much trouble and loss through repudiation of over-sea orders and shipments. Rates of sea-freight generally are considerably lower than they were a year ago, though high figures are still maintained on certain routes. The price of sulphate of copper, which was about £40 per ton in January, advanced to about £50 in March and has since fallen to about £39 10s. per ton. The demand was good early in the year both for home and export, but has since been disappointing. The export figures for the eleven completed months are 18,865 tons value £744,410, against 31,404 tons value £1,712,034 for the corresponding period of 1919 and 74,751 tons value £1,681,955 for 1913. While the home trade in green copperas has been only moderate, there has been a steady inquiry for export, but scarcity of packages and difficulty of trade with India have interfered with business. The price has fluctuated only slightly. Supplies of Acetate of lime were short during the early part of the year, but stocks began to accumulate a little time ago and latterly there has been some pressure to sell. Brown was £15 per ton in January, was steady at about £20 during the autumn and has since receded to about £15 per ton. Grey commenced the year at £26 per ton, rose to about £33 in May and is now about £24 per ton and is being offered freely for forward shipment. Stocks of Acetic acid were short in the early months and acetate of soda rose from £48 in January to about £62 10s. per ton in March. Increased supplies have caused a gradual decline in price to about £47 per ton. Business in acetate of lead and nitrate of lead has been confined to small lots, with a steady fall in price. There have been some good importations of acetate of lead from the Continent, which has also been latterly competing keenly for orders for litharge and red lead. Prices of the latter products have fluctuated ; they were £62 in January, have been as high as £73 and are now £46 5s. per ton. Some good business has been passing in lithopone and German manufacturers are making strenuous efforts to regain their pre-war supremacy. Carbonate of potash being in short supply, the price of £99 per ton for 80 per cent. in January advanced to about £103 in March and remained steady during the summer months. The arrival of shipments from Germany, &c., and a decreased inquiry have had the effect of reducing the price considerably. Stocks of Montreal potashes have been light, both in Canada and here during most of the year. Caustic Potash is gradually coming in more freely and price has a downward tendency. White powered arsenic has ruled pretty steady during the whole of the year. Price, which was about £68 in January, has been up to about £80 and is now about £72 10s. per ton ; English makes have commanded full figures in spite of good arrivals from abroad. Prussiate of potash was about 2s. 1d. in January and advanced to about 2s. 4d. in April and has since gradually fallen to about 1s. 6½d. per lb. Prussiate of soda rose from about 1s. 1½d. in January to about 1s. 11½d. in March and has since dropped to about 11½d. per lb. Both products were well called for early in the year, but latterly business has been quiet. Tartaric acid was 3s. 3½d. per lb. in January and the good enquiry during the spring chiefly for export, together with short supplies, caused an advance in price to about 4s. 1½d. per lb. in April, when a heavy premium was being paid for export. The summer demand for the home trade was, however, disappointing and though there continued a fair enquiry for export, price has gradually fallen away to about 2s. 3d. per lb. Cream of tartar was about £270 in January and owing to short supplies and a good steady demand, values rose to about £310 per ton in April. Increased arrivals eased the position and values have gradually fallen to about £200 per ton. Citric acid commenced the year in a strong position at about 5s. 6d. and price gradually increased to about 6s. 6d. per lb. in March, due to heavy American demands. Since that time the inquiry has been only moderate and price has dropped to about 2s. 9d. per lb. Bichromates of potash and soda were scarce in the earlier part of the year and prices rose from about 1s. 6d. to about 2s. 2d. and from about 11d. to about 1s. 3d. respectively. Arrivals from America and a decrease of the export demand have altered the position and prices are now about 1s. 3d. and 10½d. per lb. respectively. Oxalic acid was very scarce early in the year and values went up from about 1s. 6d. in January to about 2s. 11d. per lb. in April. The market was subsequently relieved by arrivals from the Continent and 1s. 3½d. per lb. is now being quoted. Borax and boracic acid were advanced £2 per ton in January and have since remained unchanged. Manufacturers have had difficulty in coping with orders and have recently been hampered by shortage of raw material. Phosphate of soda has been in good demand and the price rose from about £32 in January to about £45 per ton in July. Stocks were light until replenished by the arrivals of foreign supplies and the price has gradually fallen to £33 per ton. Manufacturers of alum and sulphate of alumina have been fairly well supplied with orders during most of the year. Muriate of ammonia has been in good demand for export and the figures for the eleven completed months are 6,903 tons against 5,155 tons for the corresponding period of 1919. The price was £50 in January, compared with £60 per ton at the present time. Makers of lump sal-ammoniac have been kept well employed and quotations have risen from £90 to £110 per ton.

Tar Products

During most of the year tar products have been in good demand, but latterly consumers have mostly been covering only from hand to mouth, and values generally are much easier. The production of benzoles has been readily absorbed by the motor fuel and dyeing industries, and prices have been well maintained, the highest point being reached during September. Owing, however, to the reduction of the tax on petrol in January next, the market has now an easier tendency. Toluole has maintained a good position all year. Solvent naphtha showed much activity early in the year, and the price reached 3s. 6d. per gallon in February, since when business has fallen away considerably. Creosote has been firm all year, prices gradually advancing, the figures being in January about 7½d. and now about 1s. 1½d. per gallon. The production of

crude carbolic acid has been less and the demand somewhat intermittent, and price rose from about 3s. 6d. in January to about 4s. in May, subsequently easing again to about 3s. per gallon. Liquid carbolic acid was in fairly good demand for export account for the first half of the year, and prices ruled very firm, but later there has been less inquiry and an easier position as regards prices. Crystal carbolic acid was in short supply early in the year, but the market was subsequently disorganised by forced sales of large parcels re-shipped to this country. There has been a steady demand for naphthalenes for the greater part of the year, the feature being the heavy call from the United States for the refined quality, owing to failure of local supplies. During the last few months this demand has dropped considerably, and prices are in buyers' favour. Pitch was in strong request from the beginning of the year until the autumn, when, just before the coal strike, the market steadied itself at about 190s. to 200s. per ton on rails. Reduced shipments of coal and briquettes, due to some extent to excessive purchases in contemplation of a prolonged coal strike, and to increased American and other outside competition, have latterly caused a pronounced decline in price. During the last few weeks there has been some talk of the formation of a new buying association, but it is too early yet to say what effect this is likely to have on the market. The prices of sulphate of ammonia for the home trade were fixed for the whole of the year, and there has throughout been a very fair demand. The export trade has not been so heavy as expected, though the quantities are in excess of last year's shipments, the returns for the eleven completed months showing 99,613 tons for 1920, as against 79,972 tons for 1919. The figures for January-November, 1913, were 295,930 tons.

Heavy Alkalies

Bleaching powder was selling in the home trade early in the year at about £16 per ton, and this price was subsequently advanced by about £2 per ton. Both bleaching powder and white caustic soda have been in good demand for export during the greater part of the year, and some high figures have been realised for re-sale parcels. Ammonia alkali, bicarbonate of soda and soda crystals have also been in steady request, though inquiry has somewhat fallen away recently. In the eleven completed months the exports of bleaching powder were 20,096 tons, as against 16,141 tons and 2,261 tons for the corresponding periods of 1919 and 1918 respectively. The exports of soda compounds were in excess of last year, the figures being 408,503 tons, value £6,579,615, to end of November this year, as against 284,569 tons, value £3,368,234, for the same period of 1919. There has been little variation in the prices of chlorates of potash and soda.

Of chemicals, drugs, dyes and colours, the value of the exports from January 1 to November 30 were, in 1918, £20,747,782, in 1919 £24,107,702, and in 1920 £37,712,796. The value of the imports for the same period were, in 1918, £36,107,922, in 1919 £18,485,534, and in 1920 £32,644,196.

French Potash

Current quotations are approximately £6 15s. for French Kainit 14 per cent., and £8 15s. for French potash salts 20 per cent., muriate of potash from France, £26 10s. f.o.r.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	6	to	0	3	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	115	0	0	to	120	0	0
Acid, Acetic, glacial, 99-100%	ton	77	10	0	to	80	0	0
Acetic, 80% pure	ton	65	10	0	to	66	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	0	10½	to	0	0	11
Citric	lb.	0	3	0	to	0	3	3
Formic, 80%	ton	90	0	0	to	95	0	0
Gallic, pure	lb.		6	3	to	0	6	6
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	37	10	0	to	40	0	0
Lactic, 60 vol.	ton	47	10	0	to	50	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	1	2	to	0	1	3
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	0
Salicylic, Technical	lb.	0	1	8	to	0	1	10
Acid, Salicylic, B.P.	lb.	0	2	0	to	0	2	3
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	2	2	to	0	2	4
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	60	0	0	to	65	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	95	0	0	to	100	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	110	0	0	to	115	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	80	0	0	to	82	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	23	0	0	to	24	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8
Bleaching powder, 35-37%	ton	30	0	0	to	31	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	19	0	0	to	20	0	0
,, Grey	ton	29	0	0	to	30	0	0
Calcium Carbide	ton	29	0	0	to	30	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	90	0	0	to	92	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	11	6	to	0	12	6
Oxide, black	lb.	1	0	0	to	1	0	6
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	41	0	0	to	42	0	0
Cream Tartar, 98-100%	ton	220	0	0	to	225	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	130	0	0	to	135	0	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts	ton		Nominal.					
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	67	10	0	to	70	0	0
Carbonate (White Lead)	ton	61	0	0	to	63	0	0
Nitrate	ton	62	10	0	to	65	0	0
Litharge	ton	57	0	0	to	59	0	0
Lithopone, 30%	ton	40	0	0	to	41	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to		—	
Sulphate	ton	130	0	0	to	135	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.		Nominal.					
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	1	3	to	0	1	4
Carbonate, 90%	ton	90	0	0	to	95	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	8½	to	0	0	9
Meta bisulphite, 50-52%	ton	215	0	0	to	225	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	3	0	to	0	3	3
Prussiate, red	lb.	0	3	3	to	0	3	6
Prussiate, yellow	lb.	0	1	8	to	0	1	10
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to		—	
Seconds	cwt.	5	5	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	9½	to	0	0	10
Bisulphite, 60-62%	ton	37	10	0	to	40	0	0
Chlorate	lb.	0	0	5¼	to	0	0	5½
Caustic, 70%	ton	29	0	0	to	29	10	0
Caustic, 76%	ton	30	0	0	to	30	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	27	10	0	to	30	0	0

Sodium Nitrite, 96-98%	per	£	s.	d.		£	s.	d.
Phosphate, crystal	ton	65	0	0	to	67	0	0
Perborate	ton	35	0	0	to	37	0	0
Prussiate	lb.	0	2	2	to	0	2	4
Sulphide, crystals	lb.	0	1	1	to	0	1	1½
Sulphide, solid, 60-62%	ton	25	0	0	to	27	10	0
Sulphite, cryst.	ton	45	0	0	to	47	0	0
Strontium carbonate	ton	17	10	0	to	18	10	0
Strontium Nitrate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	90	0	0	to	95	0	0
Sulphur chloride	ton	8	10	0	to	10	0	0
Sulphur, Flowers	ton	42	0	0	to	44	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	ton	19	0	0	to	19	10	0
Tin perchloride, 33%	lb.	0	2	10	to	0	3	0
Perchloride, solid	lb.	0	2	6	to	0	2	7
Protochloride (tin crystals)	lb	0	3	0	to	0	3	3
Zinc chloride, 102 Tw.	ton	22	0	0	to	0	2	1
Chloride, solid, 96-98%	ton	60	0	0	to	23	10	0
Oxide, 99%	ton	56	0	0	to	65	0	0
Dust, 90%	ton	90	0	0	to	57	0	0
Sulphate	ton	21				92	10	0
						23	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	4	6	to	0	4	9
Alphanaphthylamine	lb.	0	3	3	to	0	3	6
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	11	6	to	0	12	0
Benzidine, sulphate	lb.	0	10	0	to	0	10	6
Benzoic acid	lb.	0	2	9	to	0	3	0
Benzoate of soda	lb.	0	3	0	to	0	3	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	10	0	to	0	11	0
Betanaphthol	lb.	0	3	0	to	0	3	3
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	3	0	to	0	3	3
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	0	to	0	14	6
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	0	to	0	5	6
Nitronaphthaline	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	4	to	0	1	5
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	7	6	to	0	7	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	3	to	0	8	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	3
Resorcin, technical	lb.	0	7	6	to	0	8	6
Resorcin, pure	lb.	1	2	0	to	0	12	6
Salol	lb.	0	4	6	to	0	4	9
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	9
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Toluidine, base	lb.	0	8	6	to	0	10	0
Tolidine, mixture	lb.	0	2	9	to	0	3	0

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

Metals and Ferro Alloys

	per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	165	0	0	to	166	0	0
Antimony, English	ton	48	0	0	to	50	0	0
Copper, Best Selected	ton	82	0	0	to	83	0	0
Ferro-Chrome, 60%	ton	42	0	0	to	43	0	0
Ferro-Chrome Manganese, loose	ton	37	0	0	to	38	0	0
Silicon, 45-50%	ton	23	0	0	to	24	0	0
Tungsten, 75-80%	lb.	0	3	3	to	0	3	6
Lead Ingot	ton	24	0	0	to	25	0	0
Lead Sheets	ton	36	0	0	to	37	0	0
Nickel, Cubes	ton	215	0	0	to	215	0	0
Tin	ton	206	0	0	to	207	0	0
Spelter	ton	26	0	0	to	27	0	0

Structural Steel

Angles and Tees	ton	24	0	0	to	25	0	0
Flats and Rounds	ton	22	0	0	to	23	0	0
Joists	ton	23	0	0	to	24	0	0
Plates	ton	23	0	0	to	24	0	0
Rails, heavy	ton	24	0	0	to	25	0	0
Sheets, 24 Gauge	ton	27	0	0	to	30	0	0
Galvanized Corrd. Sheets	ton	31	0	0	to	32	0	0
Zinc Sheets	ton	58	0	0	to	60	0	0

Cardiff By-Products Market

CARDIFF, WEDNESDAY, JANUARY 5.

Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£25 10s net d. d.
For export (per ton f.o.b.)	£25 to £35
Benzol, 90's (per gallon)	3s. 5d. to 3s. 10d.
Benzol, 50's (per gallon)	3s. 5d.
Solvent naphtha (per gallon)	3s. to 3s. 2d.
Heavy naphtha (per gallon)	3s. 3d. to 3s. 4½d.
Crude naphthalene salts (per ton)	£10 to £20
Pitch (per ton)	190s. to 200s.
Creosote (per gallon)	1s. 2d. to 1s. 4d.
Motor benzol (per gallon)	3s. 5d. to 3s. 10d.
Crude benzol (per gallon)	1s. 9d.
Toluol (per gallon)	4s.

A Knighthood for Professor Walker

THE new Knights announced in the New Year Honours List include Professor James Walker, Professor of Chemistry in the University of Edinburgh. Professor Walker is in the line of teachers who have made the University of Edinburgh famous throughout the world. He was born at Dundee in 1863, and there got his elementary education. He graduated B.Sc. in chemistry and physics at the University of Edinburgh in 1885, obtaining the D.Sc. in the following year. After six months at Munich he proceeded to Leipzig, where he remained three sessions and graduated Ph.D. in 1889. On his return to Edinburgh he became research assistant to Professor Crum Brown. At the end of 1892 he was appointed assistant to the Professor of Chemistry at University College, London, and in 1894 returned to his native city as Professor of Chemistry in University College. The Royal Society of Edinburgh in 1896 awarded him the Makdougall-Brisbane Medal for his researches in physical chemistry. In 1908 he was called upon to succeed Professor Crum Brown in the chair he at present holds in his alma mater. He has been a prolific writer on various aspects of chemistry and physics.

The Physical Society's Exhibition

THE eleventh annual exhibition of electrical, optical and other physical apparatus by the Physical Society of London and the Optical Society was held on Wednesday and Thursday at the Imperial College of Science, South Kensington.

Among the exhibits were chemical and assay balances by L. Oatling, Ltd., and Lea's patent indicating, recording and integrating machine by the Lea Recorder Co., Ltd. The British Oil & Fuel Conservation, Ltd., were showing the Freeman precision temperature-control system for the automatic regulation of the supply of the heating medium and the accurate maintenance of a predetermined temperature. Bellingham & Stanley exhibited a new Pulfrich refractometer, a simple type of polarimeter, and an immersion refractometer with interchangeable prism.

A very neat season-ticket and pocket-case, in leather, is issued by Arthur J. Dickinson, Ltd., chemical manufacturers and merchants, Neptune Tar and Chemical Works, Canal Bank, Trundley's Road, Deptford, S.E.8. It is one of those simple and useful forms of New Year greetings which are always sure of a welcome, and the use it serves throughout the year pleasantly and unobtrusively preserves the memory of the firm.

Company News

NEW TRANSVAAL CHEMICAL.—Final dividends for the year ended June 30 of 3 per cent. (less tax) on the cumulative first preference, and of 4 per cent. (less tax) on the cumulative A preference shares.

VIRGINIA CAROLINA CHEMICAL CO.—The 101st consecutive quarterly dividend of 2 per cent. ($2 per share) on the Preferred stock is payable January 15, and a dividend of 1 per cent. ($1 per share), being dividend No. 56 on the Common stock, is payable February 1.

BRITISH TAR PRODUCTS, LTD.—This company has been registered as a private company, with a nominal capital of £400,000 in £1 shares (32,952 8 per cent. preferred), to take over British Tar Products, Ltd. (incorporated in 1916), and to adopt an agreement between the said old company and the Cavendish Syndicate, Ltd. (on behalf of the company). The first directors (to number not less than four, nor more than 12) are: A. Woolley Hart (chairman), A. V. Derry, J. H. W. Laverick, T. Greensmith, M. Deacon, F. Woolley Hart, J. T. Godd, F. C. Swallow, Major A. J. Gainsford and C. Agelo-Murray. The Yorkshire Coking & Chemical Co., Ltd., may, while holding £20,000 shares or stock, appoint two directors and remove any such directors (other than A. Woolley Hart and F. Woolley Hart so long as they hold between them 10,000 shares). The Tinsley Park Colliery Co., Ltd., may, while holding £10,000 shares or stock, nominate one director, the said J. H. W. Laverick being the first nominee. A. V. Derry may, while holding £10,000 shares or stock, nominate one director, and is himself the first nominee.

BRITISH BURMAH PETROLEUM.—The accounts of the British Burmah Petroleum Co. for the year to July 3 last show that the balance transferred from revenue account to profit and loss amounted to £368,419, to which are added difference in exchange, £112,086, and other items making a total credit balance of £526,353 (against £569,677 for the previous year). After deducting various charges, including £75,867 for depreciation, there remains a surplus of £330,310, to which is added £29,645 brought in, making a disposable balance of £359,956. The sum of £100,000 is placed to reserve and contingent reserve account, and a balance dividend for the year at the rate of 1s. per share, free of tax, is proposed (payable February 28), making 20 per cent., free of tax, for the year (against 17½ per cent. for 1919). The dividends for the past year have been calculated on a larger issued capital than existed at July 31, 1919. Dividends amounting to £26,064 paid by the Rangoon Oil Co. have been handed over to the trustees of this company's first mortgage debenture stock for sinking fund purposes. The report states that since the close of the financial year a further fall in the production of crude oil has taken place, due largely to the reduced yields now being obtained from the Beme Field and to the longer time required for completion of wells. The footage drilled during the year was in excess of that of the previous year, and with the additional plant now being delivered and an augmented drilling staff, it is anticipated that this decline will be arrested. The suspension of war contracts has had an unfavourable effect on the prices obtained for benzine, although the quantity marketed by the company was in excess of the previous year. An interest has been secured in oil-bearing territory on the West Coast of the Peninsula of Sina, and in options over territory in the Comodora Rivadavia District of the Argentine.

LOW TEMPERATURE CARBONISATION, LTD.—Colonel Sir Henry E. F. Goold-Adams, presided at the third annual meeting on December 30. Undoubtedly, he said, the low temperature carbonisation of coal might now be regarded as an accomplished fact, and its national importance was being more and more appreciated every day by the technical as well as by the general Press. It was clear that this country could not afford to go on wasting its coal by burning it in its crude form, thereby wasting untold millions of money annually. The plant at Barnsley was working smoothly—and smokelessly—and the results obtained from the crude coal, which takes an average of eight hours to carbonise, were in every respect satisfactory. They had no doubt that the figures would be sufficiently convincing to determine every colliery of importance, as well as the leading towns in the country, to adopt their method and arrange for the installation of plants for the treatment of the raw coal now so largely burnt to waste. No longer should we be almost entirely dependent upon foreign countries for our supplies of motor spirit, while, in addition to the heavy oils required for such purposes as distillation into dyestuffs, we should be producing for every ton of coal carbonised something like 7,000 cubic ft. of rich gas and some 20 lb. of sulphate of ammonia. Speaking as one who has studied the question of coal carbonisation for some three years past, while acting as chairman of the Nitrogen Products Committee, he could only describe such a metamorphosis of our present national practice as a revolution in coal utilisation. His own position on the board of that company was due to the fact that as a result of the investigations undertaken by the Nitrogen Products Committee, which included some of the most eminent gas, electric and chemical engineers in the country, he was convinced that the process of this company was scientifically sound, and was consequently doing work of great national importance.

BRITISH CONTROLLED OILFIELDS.—From the address of the president of the company given in the directors' report just to hand it appears that considerable progress has been made by the company in spite of the many difficulties and great expense of transport. The company holds properties in different South American Republics, the area at present controlled by it in Venezuela being considered for the time being of prime importance. The area being operated in that country is estimated to comprise between 2,000 and 3,000 square miles. The results of development obtained so far, the president states, are of such a nature as to hold out the highest promise for future production on a commercial scale. No. 1 Exploration Well, in the western division, struck oil of a very high quality at the shallow depth of 637 ft., while No. 1 Exploitation Well has reached a depth of 1,340 ft., and drilling at No. 2 Exploitation Well is proceeding. In Trinidad remarkable progress, it is stated, has been made, and arrangements are completed to conduct extensive drilling operations there. No. 1 Well, Santa Lucia, has already reached a depth of 925 ft., and No. 1 Well, San Jose, is down 192 ft.

The Government concession granted by Costa Rica covers about 6,000 square miles. Drilling outfits have already reached Port Limon for distribution to drilling sites, but the considerable drilling operations and development which had been planned have been seriously prejudiced by the action of the present Government, who have issued a decree annulling the concessions which were granted under the former Government. The president of the company states that it is believed that foreign-oil interests have intrigued to this end.

During the twelve months since the company commenced operations in Ecuador operations have been conducted at a remarkably rapid rate. A large amount of drilling plant and material has been landed, and two wells are already in course of drilling, known as Nos. 1 and 2. No. 1 well has already reached a depth of 530 ft. and No. 2 well 310 ft.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. No.
South Africa...	Steam turbo-driven centrifugal pump, condenser, piping, &c.	—
Madrid ...	Jute goods	895
China... ...	Scientific supplies	898
Brussels ...	Chemical and pharmaceutical products	—
Auckland ...	Chemical: dyes:	—
Rio de Janeiro	Chemical products: pharmaceutical products. Replies to the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1.	—

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Companies Winding Up Voluntarily

GALICIAN PETROLEUM PRODUCERS, LTD. (in voluntary liquidation). Creditors' claims on or before January 31, to D. Forde, 65, London Wall, London, E.C.2., joint Liquidator of the company.

NATIONAL PAPER & PULP CO., LTD.—Creditors claims on or before January 31, to the Liquidator, G. H. Wilkinson, Upper Thames Street, London.

PACIFIC POSPHATE CO., LTD.—Creditors claims on or before January 14, to the liquidator, A. R. Dickinson, 3, Lloyds Avenue, Fenchurch Street, London, E.C.

Liquidators' Notice

BRITISH TAR PRODUCTS, LTD.—A meeting of creditors will be held at the offices of the company, 11/12, Pall Mall, London, S.W., on Friday, January 7, at 12 noon. John Jordan, Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

CASSON CHEMICAL CO., LTD., London, W.—Registered December 23, £3,000 mortgage, to J. J. Dunville Botterell, 24, St. Mary Axe, E.C.; charged on property in Westbourne Gardens, Bayswater. *Nil. September 22, 1919.

Bill of Sale

[*The undermentioned information is from the Official Registry. It includes Bills of Sale registered under the Act of 1882 and under the Act of 1878. Both kinds require re-registration every five years. Up to the date the information was obtained it was registered as given below; but payment may have been made in some of the cases, although no notice had been entered on the Register.*]

TUTTON, H. R., 1, Wentworth Street, Huddersfield, chemist, Filed December 28, £50.

Lysle Export and Import Co., Ltd.

Compulsory Liquidation

MEETINGS of creditors and shareholders in the compulsory liquidation of this company, of 47/48, Berners Street, Oxford Street, W., were held on Thursday, December 30, at the Board of Trade Offices, 33, Carey Street, W.C.

Mr. E. T. A. Phillips, Assistant Official Receiver, who presided, said that the company was registered on December 1, 1919, with a nominal capital of £20,000, and was one of a group of companies promoted by Mr. John de Lysle, who was now a bankrupt and was stated to have left the country. The company was formed to acquire and carry on a business of exporters, importers, manufacturers and merchants of perfumes, toilets, and other chemical and medicinal preparations. According to the company's accounts, a gross loss of £3,738 was incurred on the sale of goods purchased. On August 4 last resolutions for voluntary liquidation were passed, and Mr. C. S. Denham, of 21, Bedford Row, was appointed voluntary liquidator, but a compulsory winding-up order followed in November. The failure of the company was attributed by Mr. Arthur Weller, a director, to the extravagant methods of Mr. de Lysle and to injudicious purchases of stock. A statement of the company's affairs showed gross liabilities £12,503 4s. 9d. and a deficiency in assets of £9,884 1s. 10d. As regards shareholders, there was an additional deficiency of £13,002, making a total deficiency of £22,886 1s. 10d.

The Official Receiver added that shortly before his bankruptcy Mr. de Lysle flew by aeroplane to France, and he was last heard of in Brussels.

The liquidation was left in the hands of the Official Receiver.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2 :—

ALBION BRIDGE CHEMICAL CO., LTD., The Albion Works, Albion Street, Miles Plattings, Manchester. Manufacturers, importers and exporters and dealers in chemicals, &c. Nominal capital, £2,000 in 2,000 shares of £1 each. Directors: To be appointed by subscriptions. Qualification of directors, £100.

BRITISH TAR PRODUCTS, LTD., 11 and 12, Pall Mall, S.W. 1. Distillers and refiners of tar, benzol, petroleum and other oils. Nominal capital, £400,000 in 400,000 shares of £1 each. Directors: A. W. Hart, A. V. Derry, J. H. W. Laverick, T. Greensmith, M. Deacon, F. W. Hart, J. T. Todd, F. C. Swallow, Major A. J. Gainsford, C. Angelo-Murray. Qualification of directors, £1,000. The Yorkshire Coking & Chemical Co., Ltd., so long as they shall be holders of shares in the Company to the amount of £20,000, shall be allowed to nominate two directors. A. W. Hart and F. W. Hart shall be deemed to be nominated. The Tinsley Park Colliery Co., Ltd., so long as they shall be holders of shares in the Company to the amount of £10,000, shall be entitled to nominate one director. J. H. W. Laverick shall be deemed to have been nominated. A. W. Derry, £10,000. Remuneration of directors, £150 each. Chairman, £300.

COMPAGNIE COMMERCIALE DU NORD (GREAT BRITAIN). General merchants and agents in chemicals, drugs, produce, &c. Nominal capital, £20,000 in 20,000 ordinary shares of £1 each. Directors: C. I. Carlson, T. G. Piper. Qualification of directors, one share. Remuneration of directors, £75 each.

DIAMOND COLOUR AND CHEMICAL CO., LTD. December 24, 1920. Chemical, colour and dye manufacturers. Nominal capital, £3,000 in 3,000 shares of £1 each. Directors: To be appointed by subscriptions. Qualification of directors, £10. Remuneration of directors, £100 each. Subscribers: A. Van den Bergh, Julia Van den Bergh.

OIL SERVICES, LTD., 5-6, Bucklersbury, E.C.4. Oil and grease manufacturers. Nominal capital, £5,000 in 5,000 ordinary shares of £1 each. Director: W. H. Huxley (governing director). Qualification of directors, 50 shares.

PRICE STUTFIELD & CO., LTD., 6, Fenchurch Buildings, E.C.2. Chemical merchants. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: E. Paskell, S. R. Price, B. Stutfield (permanent directors). Qualification of directors, £500. Remuneration of directors, £50 each.

RED SEA PHOSPHATES, LTD., 17, Commercial Street, Cambone, Cornwall. Miners and mining of phosphates, nitrates, guano, coal, &c. Nominal capital, £10,000 in 1,000 shares of £10 each. Directors: D. Currie, M. Ismalum, W. G. Wagner. Qualification of directors, £200.

UNITED MARKETING CO., LTD., Ivy Oil Works, Dumballs Road, Cardiff. To carry on the manufacture of oils, oil products, by-products and substitutes. Nominal capital, £50,000 in 50,000 shares of £1 each. Directors: To be appointed by subscribers.

The report of the Ceylon Chamber of Commerce states that in 1919 the exports of citronella oil were almost identical with those of 1918, the actual figures being 1,050,989 lbs. for 1919 and 1,048,202 lbs. for 1918.

Our attention has been drawn to the "Centrac" collapsible tube filling machine for filling pomades, ointments, creams, tooth pastes, &c., into collapsible tubes, pots, jars, &c. These machines can be adjusted to regulate the quantity to be delivered in each tube, and have a special cutting-off device to prevent dripping or waste. They are made by the Banister Street Works, Ltd., Homerton, E. 9, who also make the "Centrac" tube closing and folding machine, the "Centrac" filling tap and other devices.